



ISSN 2278 – 0211 (Online)

Design and Development of Hand Painted Apparels Using Ecofriendly Dyes

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Abstract:

“There is no better designer than nature.”- Alexander McQueen.

The growing concerns about environmental issues are playing an increasingly important role in the textile industry. The use of eco-friendly dyes, as one of the means to create hand painted silks to protect the environment. The silk craft is a very noble art, exalts the rich and helps the poor. The technique of decorating cloth with a free hand application of color or using a tool which does not of itself produce a repeat image has been practiced mainly in the east. “Painted silks” evoke all the mystery and magic of the orient or the eastern cultures. As a Garment or fabrics, silk drapes beautifully, and the weaves and weights of the different texture will affect the flow and line of each piece. The depth of dyes brings out fabrics luster, and with its drape flowing with sensors, opines Diane Tuckman (1992).

The study aims at Hand painting silks with eco-friendly dyes with different solvents/buffers with limitless variety of exciting designs. The techniques used are easy, simple and can be finished at home which do not cause harm to the environment and ecology.

Hand paintings express a rarer fineness in which the forms radiate a warm and gentleness through the techniques used. The colors are exuberant and bright and speak volumes for the depth, the fine skill and passion which reflect ethereal beauty. The richness of the ancient art, showcased through the contemporary designs developed in this study brings in the freshness of intricate designs, which is seen through art practiced on silk and the colours used.

A preliminary pilot study was conducted to study the trends, fabrics and design features available in the market. Based on the study crepe silk and silk chiffon fabrics were selected for hand painting using different techniques. The process and designs are designed to rejuvenate the user’s persona as well as benefits by providing simpler methods. The finished samples were evaluated for mechanical properties, subjective assessment, Eco parameters of the selected dyes Spectrophotometric assessment to find out the change in color properties.

The seven techniques of Hand painted fabrics were used for designing and development of Crepe silk and silk chiffon Kurtis, Sarees, blouses and Accessories. A collection of 7 techniques of hand painted Kurti’s, sarees with blouses and accessories both in crepe silk and silk chiffons were designed keeping fit, functionality ,comfort factors and trend in mind. The apparels were designed and constructed using pattern making and garment construction techniques. The acceptance study was conducted for 50 respondents from textile and non- textile background respectively. The date was analyzed using various statistical tools and methods.

The Major Findings of the Research Were As Follows

From the pilot study it was evident that the hand painted Kurtis, Sarees were not available over the market the ones that were available were the ones which were dyed, printed or woven. There was much scope for hand painting with eco friendly dyes with contemporary designs.

The geometrical properties of the greige and the painted silk fabrics were compared and it was clear that the weight of the hand painted samples had reduced after painting as the fabric was subjected to washing process for the removal of residual gum and other impurities present in the greige fabric. The thickness of the painted silk crepe remained unchanged, where as the silk chiffon had reduced minimally. The overall geometrical properties of the painted samples have bought the closeness and consolidation of the fabric set.

The eco parameters of the selected dyes were tested to determine the banned amines present in the dyes. The result showed that the dyes used in the painted samples did not contain any of the banned amines as per the German Regulation. Hence the selected dyes were found to be 100% eco friendly.

Assessment on the quality aspects of painted fabrics were carried out to check the dimensional change for silk chiffon and silk crepe before and after painting. Both chiffon and crepe fabrics reported good improvement in dimensional stability after painting and better ability to withstand wear and tear which is essential for apparels.

The degree of pilling for both unpainted and painted silk chiffon and crepe silk fabrics the samples showed the same pilling rating of 5 (5-No change) therefore the painting treatment has not affected this property of the fabric.

The drapability of the painted samples displayed considerable drapability within the range of + 0.5 in comparison with the unpainted fabrics in case of both silk chiffon and crepe silk fabric. Hence both silk chiffon and crepe silk fabrics reported good drapability after painting which is essential for apparels.

Spectrophotometric assessment of painted fabrics for colour measurement and colour coordinates were carried out at the wavelength of 400nm to 700nm. Using the k/s value shade cards were developed for painting. The data was taken to know the strength of the colors used and the analysis was not done on the finished sample since the shade created by the mixture of green chemicals and the colors would vary throughout the sample giving varied effects on crepe silk and silk chiffon.

The colour fastness properties for washing, rubbing dry and wet, sunlight and perspiration was carried out it was evident that both silk chiffon and crepe silk samples painted using different techniques showed good to excellent colour fastness properties.

The subjective assessment showed that crepe silk and silk chiffon fabrics after painting showed significant improvement in smoothness, softness and lower stiffness when compared to unpainted crepe silk and silk chiffon fabrics there by making it suitable for designing and development of hand painted apparels.

The body measurements for young women in the age group of 18-30 years were standardized and the study showed that apart from the bust and waist measurements which were less than the standards, the rest of the measurements were almost similar. For the Kurti the circumference measurement, bust, wait and hip measurement were the main focus and the chart showed that all the measurements were in the standard range for petite size. These measurements were used to design and develop the Kurti's and Saree blouses.

The acceptance study very clearly depicted that both textile and non-textile respondents readily accepted and appreciated the effort taken to design apparels using different hand painting techniques with eco-friendly dyes. Similar, results were absorbed through statistical analysis like T-test, Co-relation and Fredmanns test. These hand painting techniques enhanced the surface value of crepe silk and silk chiffons there by making it a diverse art, unique and a good entrepreneurial venture with good job opportunities for women to work from home to earn their livelihood.

Thus it was clear from the study that hand painted crepe silk and silk chiffon with different techniques using eco –friendly dyes was well accepted by consumers. The consumers felt that it was a very unique, innovative and novel product, thereby making it ideal for apparels which can be marketed under the brand name Eco moiré, simply beautiful. Green stands for growth, harmony and peaceful reassurance.

CHAPTER I

1. Introduction

“The natural environment sustains the life of all beings universally”, -Dalai Lama.

When Dalai Lama proposed this thought he also meant that not only should our actions reduce the pressure on our immediate environment but also should reap benefits for our fellow beings, which is what is humanity.

It's no secret that the fashion industry needs to step up its terms of sustainability. As fashion continues a movement to become more eco-friendly, alternative production methods and materials are being tested out all the time. The textile industry is considered as the most ecologically harmful industry in the world. The eco- problems in textile industry occur during production processes and are carried forward right to the finished products. Wet processing like bleaching and dying process produces toxin that swells into our ecosystem. The threat to the environment has come due to use of chemical dyes that has led to stressing need for eco-friendly dyes. It is interesting to note that India is one of the few civilizations to perfect the hand crafted art on cloth. Hand painting on silk is an extremely popular art form in India and one can find a wide range of beautiful and exciting design. The existing art forms in painting are Madhubani, Warli, Kalamkari and Kerala Mural art. These painting techniques are complicated which require a lot of practice. The raw materials for each of these techniques are expensive. The motifs in most of them are from the mythological stories, creepers and tribal motif. Facial features are the hallmark of these paintings, which makes it difficult for one to learn the art and master it in a short span of time

Fashion design is the art of the application of design, aesthetics, and natural beauty to clothing and accessories. Fashion design is influenced by cultural and social latitudes, and has varied over time and place. Fashion designers work in a number of ways in designing clothing and accessories for the market, all the time anticipating the changing consumer tastes and demands.

Given the long- term impact of climate change and global warming, the call for the production and consumption of green products becomes even more urgent and necessary. The growing momentum to promote the use of green products only proves that people are already accepting the fact that climate change is no fad. We are more aware about it now than in the past because the effects are more apparent today. This trend creates a huge niche for both environmentalists and entrepreneurs to come up with innovative solutions that would change people's mindset toward the environment by introducing new eco- friendly products in the market. This trend envisaged to change human consumption in the long term, thereby instilling a paradigm shift that would enable consumers to act as environmental stewards as they patronize eco- products to help achieve environmental sustainability.

Eco-fashion is about making clothes that take into account the environment, the health of consumers and the working conditions of people in the fashion industry. There are a variety of materials considered "environmentally- friendly" for a variety of reasons. When moving to an environmentally- friendly fabrics, design and lifestyle are the key elements to be considered in fashion. In the recent years, a lot of design themes are concurring about environment issues like global warming. The natural source of design includes flowers, leaves, birds, insects and animals. Nature has always been a finer inspirer for designs. Color and design are subjective. It is a fundamental consideration in the design process.

The use of eco friendly dyes for coloration of textiles has mainly been confined to craft dyers, painters and printers. However, recently more interest is being shown in the use of these dyes and a limited number of commercial dyers are using it for dyeing and printing of textiles. Fabric dyeing has been considered almost a "necessary evil". The process requires large amount of water and in case of synthetics, dangerous chemicals can cause harm at various levels of the chain of life. Until very recently, there was no alternative that could match the quality of commercial dyes and commercial dyeing process. Green chemicals or green ingredients come into play here which help in reducing the carbon footprint and are recyclable.

Dyes differ from paints in the way they bond with the fabric. Through the chemical reactions, Dyes become a part of the fiber and the molecule of dye bond with the molecules of the fibers. Silk painters often choose dye because it does not change the hand or the natural sheen of silk and colours appear to have a greater luminosity. Paint on the other hand, lays on the surface of the cloth and after heat fixing attaches permanently to the fabric. According to Morton W E Hearle (1993) "Without molecular bonding paint will alter the drape and natural sheen of the silk; but it is the ease of fixing the paint on the cloth that makes this colorant the choice for some silk painter." Silk was the most promising natural fabric and was considered as a prime fabric for the purpose of this study.

Silk has reigned for centuries as the queen of textiles. It is the fiber of ancient dynasties – a lustrous fabric that shimmers with secrets and histories from faraway places. A gift from nature this sought after fiber is produced from the threads of a silkworm. Even in this age of high technology we must rely upon a carefully coddled caterpillar for the pleasure of silk. Of the many silk producing caterpillar species, the mulberry silk moth- *Bombyx Mori*- supplies ninety nine percent of the world's present day commercial silk. The single silk fiber is uniform, but too fine to be woven into cloth. Four to ten strands must be spun together to create a durable, practical thread. The thread is then woven into a variety of fabric weaves- retaining the beautiful hand and luminescent quality that make silk a joy to hand paint. Varieties like, Crepe silk and silk chiffon are popular because of their enchanting luster and affinity to green chemical dyes.

Art is applied life. India, which has had a rich and varied existence for thousands of years, has naturally come to inherit a unique art tradition. Modern designing in India is a recent trend and with growing appreciation of its values, designers are looking back to traditional forms and to contemporary development for their inspirations and sustenance with equal measure. In applications of designs, the artists of old seldom lost their sense of proportion and balance, the main theme of the work was never lost sight of in the exuberance of decoration.

According to a report in www.lenoeudpapillon.blogspot.com (2013) "When it comes to prints, natural florals dominate the catwalk, many of which come alive like a garden in full bloom. A more humanist approach was embraced by many fashion houses that chose to paint contemporary paintings on their fabrics."

Hand painted silk art boasts of the longest history among Indian handicraft art forms, with a classic, timeless appeal and statement of elegance. Hand painting represents the power of starting to move, activity of letting go, opening up to freedom, all starting from a point into the center that is the center of determination to achieve goals. Silk painting is the art of applying dye to silks. Movement and fluidity are the hallmark of this art form. As the paintbrush of the artist delicately guides the flow of the liquid, the colors glide through the silk and generate delight and excitement. Often silks are used as scarves, handkerchiefs and ties. The finished works can also be framed pictures, wall hangings, or household décor. Silk paintings are quick and easy so experience in art is necessary. Painting on silk can be as simple as filling in colours. On the other hand, an artist can create a beautiful original painting on silk. The silk seems to glow with vibrancy and a special luster, adding a wonderful animation to the painting. Even the simplest painting on silk is beautiful because of the glow and warmth of the silk shining through.

Hand Silk painting is almost the opposite of other types of painting. Generally, the artist paints by controlling the placement of pigment on a surface, usually through the uses of brushes. In silk painting, the painter controls the movement of the pigments within boundaries such as a resist on the silk. Brushes become much less important because the dye will move on the silk after it is placed there. Because the dyes flow so freely on silk, the job of the hand silk painter is to control the movement of the pigment on the silk rather than its placement. The small brush strokes are achievements in reality to attract the eyes.

The artists can also add dimension with colour, shading and various surface techniques. Painters use some of the same techniques as watercolorists to create unique designs. The use of salt, alcohol effects, wet on wet treatment, wet on dry treatment are common on silk paintings. However the effect on silk are often more dramatic than on paper, Techniques usually have to be applied in different ways on silk than those used by watercolorists.

A limitless variety of exciting designs can be produced by painting techniques using eco-friendly dyes directly on fabrics. The diversity of techniques gives the design freedom to experiment with eco friendly colour, shade, texture and form. Hand painting emphasizes free expression, through the medium of silks and eco friendly dyes are the demand of textile and the need of the hour. Hence the study aims at painting silks with eco-friendly dyes with different solvents/buffers on silk fabric with different floral, abstract and conventional designs, as the name indicates, thereby minimizing pollution. It is imperative that while designing and colouring clothes through hand painting, care is taken not to pollute the environment. The objective of the study was to study the effects of different solvents/buffer medium with eco friendly dyes, its visual effect on the fabric and also to know the consumer preferences of hand painted apparels and their acceptance.

In agreement to Barry Commoner (2012) who said that the proper use of science is not to conquer nature but to live in it, to conclude, most damage that “we” humans have caused to our planet is the result of our own ignorance and designers have now to play the role of activists, an activist being not only the one who says the river is dirty, but a design activist who cleans up the river himself.

Through the efforts of this study, the goal was to de-clutter and detox the complexities that dyeing has got into our lives. The process and designs are designed to rejuvenate the user’s persona as well as benefits by providing simpler methods. The apparels will be designed keeping the current trends, silhouettes which will guarantee the end users and make them feel one among a few thousands who care for Mother Nature and want to save nature and the beautiful world for future generation.

According to Wei Chen and Meizehen in their study (2011) “The design methods based on modern science and art concept retain the original aesthetic characteristic, and furthermore do innovation in process, pattern and fabric design.”

Through this study one proposes and attempts to combine the three genres of human aesthetics: Art, Science and Design. The aspects of art will be incorporated by bring out the art and techniques of hand painting onto the fabric and design process. The learning’s from textile science will lead to the implementation of new and innovative hand painting process using eco friendly dyes to achieve sustainability to its totality. Design skills will be utilized to create beautiful and trendy eco-friendly hand painted products which will have a much smaller carbon footprint, with beautiful designs

Chapter II

2. Materials and Methods

2.1. Phase I – Pilot Study

A preliminary pilot study was conducted for retailers and manufacturers dealing with different categories of fabrics and apparels. The respondents comprised of 50 retailers and manufacturers dealing with different categories of fabrics and apparels. The respondents were selected randomly from different areas of Bangalore city and comprised of brands such as Mother Earth, BIBA, Satya paul, Soch, Favourite Shop, Roop Sangam, Samyakk, Kalamandir, Sudarshan silks, Arpitadeepam, Hamadan Inn, Jashn, Vastra, Kalanjali, Mughal Arts, Harra KBC, Mom and Me, Kalanikethan, VEE Pee Collection, Show Case, Roopam silks International, Kalyan Silks, Kala Sangham, Fashion World, Wild West, Sparsh, Vinegar, Tommy Hilfiger, Label Ritu Kumar. An interview schedule was prepared and oral interview was carried out in order to get information on the availability of hand painted fabrics, trends in fabrics used, design details and surface ornamentation that were currently available in the market. (The interview schedule is shown in Appendix I).

PHASE –II EXPERIMENTATION

2.2. Materials and Methods of Application

2.2.1 (I) Selection of Fabrics Material

Fabrics used for Hand Painting are commercially available silk chiffon with weight of 40 GSM and crepes silk weight of 60 GSM were selected and used for the study. The fabrics were sourced from Rukmini Silks, Bangalore, and the raw sample is shown in Appendix IV

2.2.1 (II) Selection of Dye Material, Chemicals and Auxiliaries

Non benzoate Acid dyes, Reactive dyes, solvent, acetic acid, urea, sofalite, gum, bee wax, paraffin wax.

2.2.1 (III) Standardization of Dye Using Pantone Shade Card

The dye was standardized and shade card was developed using all the colours that were to be used in the hand painting techniques. The colors that were used are listed in the table 2.1 with the colour strength value and K/S value.

Sl. No	Type	Pantone shade Name	K/S	Strength%
1	Lighter	Prison	94.018	183.94
	Darker	Amazon	172.94	
2	Lighter	Dusk Blue	43.555	380.64
	Darker	Classis Blue	165.791	
3	Lighter	Alloy	39.592	133.47
	Darker	Turbulance	52.844	
4	Lighter	Moss	69.511	227.39
	Darker	Calta Green	158.063	
5	Lighter	Claret Red	39.349	266.85
	Darker	Barberry	105.003	
6	Lighter	Golden Yellow	59.433	287.15
	Darker	Burnt Orange	170.661	
7	Lighter	Anrora	48.2	121.43
	Darker	Green Sheer	58.531	
8	Lighter	Pink Carnotiox	38.323	135.24
	Darker	Very Berry	51.828	
9	Lighter	Cedar	63.131	223.43
	Darker	Lalla Green	141.052	
10	Lighter	Marven Wood	27.229	488.65
	Darker	Red Plum	133.053	
11	Lighter	Steel Gray	87.025	357.124
	Darker	Anthracite	310.787	
12	Lighter	Dazzling Blue	43.716	389.57
	Darker	Twilight Blue	170.304	
13	Lighter	Bachelor Button	35.656	270.59
	Darker	Hawaain Ocean	96.48	
14	Lighter	Hyacinth violet	73.353	187.541
	Darker	Gloxinia	137.566	
15	Lighter	Sangaria	32.859	389.96
	Darker	Rhododendron	128.135	
16	Lighter	Mocha Mousse	57.737	166.72
	Darker	Galzed Ginger	96.261	
17	Lighter	Russet Orange	93.412	133.87
	Darker	Harvest Pumpkin	125.049	
18	Lighter	Geronium	51.535	275.95
	Darker	Virtual Pink	142.21	
19	Lighter	Aztec	96.116	159.04
	Darker	Potting Soil	152.859	
20	Lighter	Frozen Dew	5.816	206.13
	Darker	Custard	11.988	
21	Lighter	Crystal Gray	35.656	268.53
	Darker	Adobe Rose	96.48	
22	Lighter	Sylvan Green	51.535	275.95
	Darker	Pale Green	142.21	

23	Lighter	Pastel Blue	39.349	266.85
	Darker	Pale Green	105.003	
24	Lighter	Russet Red	4.828	114.1
	Darker	Harvest Pumbkin	5.508	
25	Lighter	Geronium	3.553	331.47
	Darker	Virtual Pink	11.776	

Table 2.1: list of colours used for hand painting (Pantone shade Name) along with its Strength and K/S Values

2.2.1(IV) Equipments Used in Hand Painting of Silks

Acid dyes, Water bath, steel vats, weighing balance, containers, measuring jars, beakers, stirrer, spatula, spoons, thermometer. Frames, Pins, Brushes of different sizes, applicator, dyes, wax, Gutta, thinning agent, scissors, pencil, masking tape, cotton, wool, drawing paper, hair dryer, harite, cord, and wooden stick.

2.2.1(V) Ingredients Used For Preparation of Dyes to Paint (Common To All Techniques)

- Eco friendly Acid dyes – 5 parts
- Solvent - 25 ml
- Acetic acid - 3 parts
- Urea - 2 parts
- Distilled water - 60 ml
- Natural Gum - 5 parts

2.2.1 (VI) Materials Used For Accessories

Hand painted silk chiffon, crepe silk, wooden beads, metal beads, jump rings, twisters, metallic wire, pin, threads, posts, cutters, elastic, pliers were selected for making accessories.

2.2.1(VII) Trims and Accessories Used For the Construction of Kurtis and Saris Blouses

Interlinings, Interfacing, Elastic, Self cord, cotton blended threads for silk chiffons, sharp universal needle 60/8 and 65/9 for silk. Crepes sharp universal needle 65/9 and ball point needle 70/10, fabrics buttons, hooks and eyes.

2.2.2 Methods

2.2.2.1. Preparation of Fabrics before Painting (Common to All Techniques)

The fabric is washed before painting to remove any sizing materials. Wash silk thoroughly in warm soapy water, rinse in warm water and roll in a tea towel to remove excess moisture. Iron with steam iron while still, damp. The fabrics are ready for painting.

2.2.2.2. Stretching Silk on a Frame or Harite

Stretch the silk on the harite (two long strips of wood with brass nails holding the fabrics firm) these can be adjusted to any length. The length adjusted here is 44" in length and breadth. The two wooden bars holds the fabrics firmly with the help of brass nails and the wooden bars having strings that are tied like hammock, so that the fabrics is firmly held. It is always better to wet the fabrics before stretching as it stretches well.

2.2.2.3. Painting Techniques of Silk Fabricss

2.2.2.3 (I) Preparation of Gum for Painting

- **Water** - 1 litre
- **Gum** -70 gms

Heat water in a pan and mix the gum well in cold water before adding it to hot water. Add the gum when the water is hot and stir well without lumps and keep aside for 24 hours. The gum swells up and settles down, stir the gum well before use and the gum is ready.

2.2.2.3 (II) Ingredients Used for Preparation of Water Based Gutta or Serti

10 gms of sofalite white chips mixed with 100 ml of hot water. Once the sofalite dissolves in water then add 25 ml of gum liquid and stir well. The gum may be added according to the required paint consistency. The Gutta is ready.

2.2.2.3 (III) Gutta Technique**Silk Crepe and silk Chiffon**

- The Gutta technique is also known as resist or serti technique where gutta is a transparent colorless outliner which helps in drawing outlines of the designs and also act as resist on silks.
- When the out lines drawn are completely dried the painting is carried out starting first with light colour and then with dark colour dye paint. The painted sample is allowed to dry for 2 hours.
- The colour on the painted crepe fabrics and silk chiffons are fixed by steaming. The fabrics are rolled in white paper and steamed for 1 hour at 40⁰ C.
- The sample is allowed to cool down and then washed with cold water to remove the unfixed dyes.
- The silk crepe Kurti was painted with pantone shade 11-0105 Antique white, shade 19-4023 blue nights, shade 19-0419 Rifle green.
- The silk chiffon Kurti was painted with pantone shade 18-6024 TPX Amazon, Shade 15-0953 TPX Golden Yellow, Shade 17-6212 TPX Sea Spray, shade 18-0527 TPX Olive Branch
- The silk Crepe Saree was painted with pantone shade 18-3946 TPX Baja Blue, Shade 11-0602 TPX Snow white, shade 17-1612 TPX Mellow Mauve.
- The silk chiffon Saree was painted with pantone shade 17-2033 TPX Fandango Pink, 14-0755 TPX Sulphur, and Shade 11-0602 TPX Snow white.
- The painted sample is subjected to calendaring.
- The same procedure is followed for Crepe silk and silk chiffon sarees.

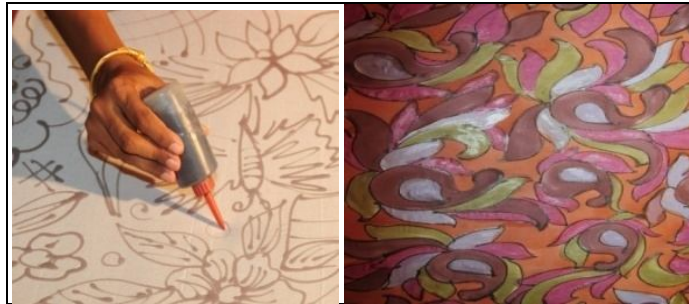


Plate No 2.1: Before And After Painted Sample Using Gutta Technique

2.2.2.3 (IV) Alcohol Technique**Silk Crepe and silk Chiffon**

- The crepe fabrics is painted with light colour first and then followed by dark colours.
- When the painted fabrics are still wet drops of 5% strength of ethyl alcohol is dropped on the painted surface.
- Painted dyes were pushed away to the edges by the action of alcohol by creating a dark line with colour concentration at the edges.
- The colour lightens at the center and the dye pigments build up at the edges appearing much darker.
- The process was repeated several times to get the desired effect and is allowed to dry for 2 hours.
- The colour on the painted crepe fabrics is fixed by steaming. The fabrics is rolled in white paper and steamed for 1 hour at 40⁰ C.
- The sample is allowed to cool down and then washed with cold water to remove the unfixed dyes.
- The silk Crepe Kurti fabrics were painted with pantone shade 16-1504 TPX Sun Flower, 18-1027 TPX Bison.
- The silk chiffon Kurti fabrics was painted with pantone shade 19-0419 TPX Rifle Green, 18-6024 TPX Amazon
- The silk Crepe Saree was painted with pantone shade 18-2336 TPX Very Berry, 19-1718 TPX Fig, 17-3730 TPX Paisley purple, 16-2124 TPX Pink Carnation.
- The silk chiffon Saree was painted with pantone shade 19-2520 TPX Potent purple, 19-3847 TPX Deep Blue, Shade 19-0912 TPX Chocolate Brown.
- The painted sample is subjected to calendaring.

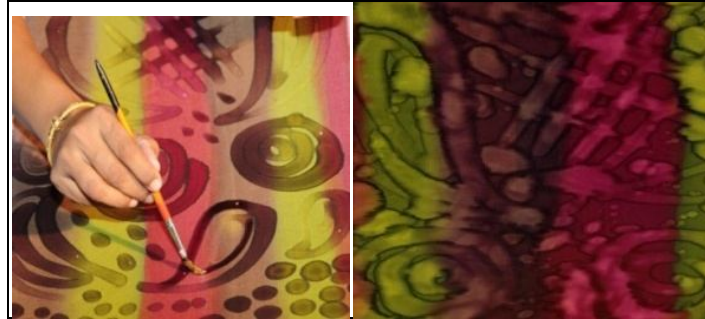


Plate No 2.2: Before And After Painted Sample Using Alcohol Technique

2.2.2.3 (V) Salt Technique

Silk Crepe and Silk chiffon

- The crepe fabrics is painted with light colour first and then followed by dark colours.
- When the painted fabrics is still wet with dye 50 gms crystal salt is sprinkled all over the painted surface.
- The crystal salt (Sodium Chloride) is saturated with pools of dye. Salt causes the dye to move as it is soaked in each grain. The grain of salt observes colour and create darker area there by creating a design by itself. The painted sample is allowed to dry for 2 hours. Brush off the salt well from the crepe fabrics
- The colour on the painted crepe fabrics is fixed by steaming. The fabrics is rolled in white paper and steamed for 1 hour at 40⁰ C.
- The sample is allowed to cool down and then washed with cold water to remove the unfixed dyes.
- The silk Crepe Kurti fabrics was painted with pantone shades 19-3952 TPX Copper sulphate blue, shade 19 – 4050 TPX Nautical Blue, shade 18 -4535 TPX Blue Jewel.
- The silk chiffon Kurti fabrics is painted with pantone shade 19-4052 TPX Classic Blue, shade 19 – 4044 TPX Limoges, shade 19-3864 TPX Mazarine blue.
- The silk Crepe Saree was painted with pantone shade 19-4007 TPX Anthra cite, shade 19 – 3919 TPX Night Shadow Blue, shade 19-4150 TPX princess blue, Shade 19-0236 TPX Garden green.
- The silk chiffon Saree is painted with pantone 19-4053 TPX Turkish Sea, 18-3963 TPX Spectrum Blue.
- The painted sample is subjected to calendaring.

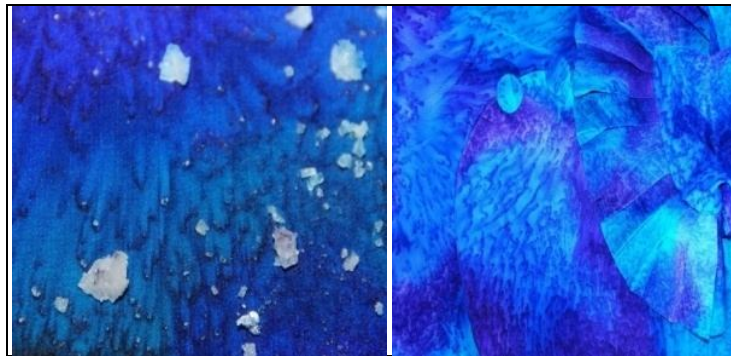


Plate No 2.3: Before And After Painted Sample Using Salt Technique

2.2.2.3 (VI) Sugar Technique

Silk Crepe and Silk Chiffon

- The crepe fabrics is painted with light colour first and then followed by dark colours.
- The 25 gms of sugar crystal is sprinkled all over the painted surface.
- The sugar crystal is saturated with pools of dye. Sugar causes the dye to move slowly as it is soaked in each grain.
- The grain of sugar observes colour and create lighter area there by creating a design by itself. The painted sample is allowed to dry for 2 hours. Brush off the sugar well from the crepe fabrics
- The colour on the painted crepe fabrics is fixed by steaming. The fabrics is rolled in white paper and steamed for 1 hour at 40⁰ C. The sample is allowed to cool down and then washed with cold water to remove the unfixed dyes.

- The Silk Crepe Kurti fabrics are painted with Pantone shade 16-0639 TPX Golden Olive, 16-4535 TPX Blue atoll, Shade 16-0421 TPX Sage.
- The silk chiffon Kurti Fabrics is painted with Pantone shade 19-4027 TPX Estate Blue, shade 19-4013 TPX Dark navy.
- The Silk Crepe Saree is painted with pantone shade 19-3022 TPX Gloxinia, shade 19-2520 TPX Potent Purple, shade 18-2525 TPX Magenta haze, Shade 16-1520 TPX Lobster Bisque.
- The silk chiffon Saree is painted with Pantone shade 19-4007 TPX Anthro cite, Shade 16-4525 TPX Maui Blue, Shade 18-0435 TPX Calla Green, Shade 18-0201 TPX Castle Rock, Shade 18-1244 TPX Ginger Bread.
- The painted sample is subjected to calendaring.

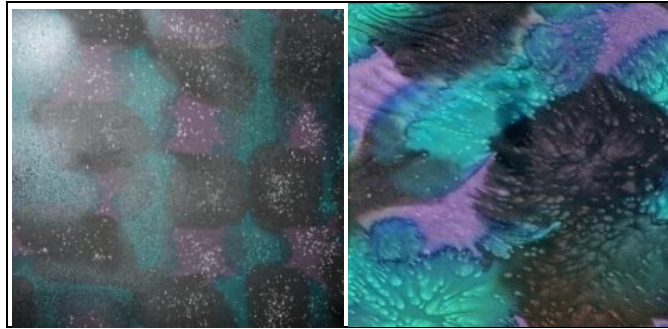


Plate No 2.4: Before And After Painted Sample Using Sugar Technique

2.2.2.3 (VII) Water Technique (Wet on Wet)

Silk Crepe and Silk Chiffon

- The fabrics is painted first with water when the fabrics is wet the dye is painted with dark colours.
- The water on the fabrics allows the painted dye to spread there by forming a shaded effect from dark to light.
- The wet on wet effect merges the dyes and create a design by itself due to merging of colours. The painted sample is allowed to dry for 2 hours.
- The colour on the painted crepe fabrics is fixed by steaming. The fabrics is rolled in white paper and steamed for 1 hour at 40⁰ C. The sample is allowed to cool down and then washed with cold water .
- The silk crepe fabrics was painted with pantone shade 16-1333 TPX doe, shade 15-0953 TPX Golden yellow; 18-5619 TPX Tide pool, shade 19-1761 TPX Tango red, shade 12-0817 TPX Apricot gelato, shade 18-0935 TPX Buckthorn brown, Shade 18-0430 TPX Avocado.
- The silk chiffon fabrics was painted with pantone shade 19-1250TPX Picante, shade 19-1940 TPX Rumba Red
- The silk crepe Saree was painted with pantone shade 18-1756 TPX Tea Berry, Shade 19-2118 TPX Wine Tasting, Shade 13-0922 TPX Straw, Shade 18-0435 TPX Calla Green.
- The silk chiffon Saree was painted with pantone shade 19-4150 TPX Princess Blue, Shade 16-4134 TPX Bonnie Blue.
- The painted sample is subjected to calendaring.

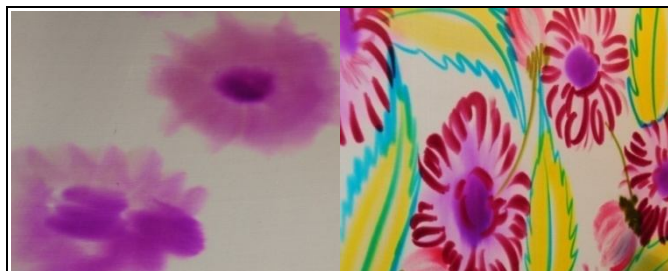


Plate No 2.5: Before And After Painted Sample Using Water Technique

2.2.2.3 (VIII) Urea Technique**Silk Crepe and Silk Chiffon**

- The crepe fabrics is painted with light colour first and then followed by dark colours.
- When the painted fabrics are still wet with dye 25 gms urea is sprinkled all over the painted surface.
- The urea is saturated with pools of dye. Salt causes the dye to move as it is soaked in each grain.
- The grain of urea observes colour and create darker area there by creating a rain drop design by itself. The painted sample is allowed to dry for 2 hours.
- Brush off the urea well from the crepe fabrics
- The colour on the painted crepe fabrics is fixed by steaming. The fabrics is rolled in white paper and steamed for 1 hour at 40⁰ C. The sample is allowed to cool down and then washed with cold water to remove the unfixed dyes.
- The silk Crepe Kurti fabrics was painted with pantone shade 18-5338 TPX ultra Marine green; shade 19-0230 TPX Garden Green, shade 19-4024 TPX Dress blues.
- The silk chiffon Kurti fabrics were painted with pantone shade 19-1436 TPX Cinnamon, Shade 13-0752 TPX Lemon.
- The silk Crepe Saree was painted with pantone shade 17-1046 TPX Golden Oak, Shade 18-1031 TPX Toffee, Shade 16-1454 TPX Jaffa orange, Shade 19-1725 TPX Tawny Port.
- The silk chiffon Saree was painted with pantone shade 16-1054 TPX Sun flower, Shade 18-1856 TPX Virtual Pink, Shade 16-1432 TPX Almond, Shade 19-2118 TPX Wine Tasting.
- The painted sample is subjected to calendaring.

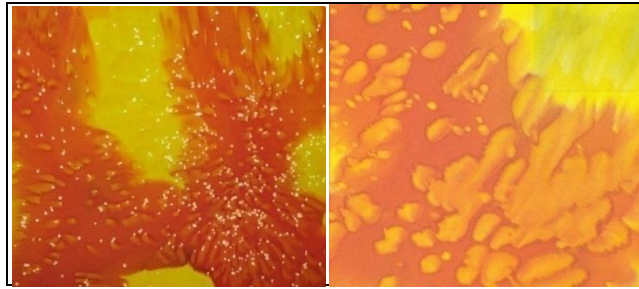


Plate No 2.6: Before And After Painted Sample Using Urea Technique

2.2.2.3 (IX) Batik Innovative Technique**Preparation of wax for painting**

60 gms of paraffin wax is mix with 40 gms of bee wax and melted in a double boiler till the wax comes to a liquid state. The wax is ready for application on the fabrics.

Silk Crepe and Silk Chiffon

- The crepe silk fabrics is painted with wax using tjanting and allowed to dry and then the dye is painted on the fabrics and allowed to dry.
- The fabric was twisted to give the crackled effect and is then painted to get the perfect batik effect. Then the fabrics are allowed to dry and then the fabrics were soaked in hot water to remove the wax.
- The colour on the painted crepe fabrics is fixed by steaming. The fabrics is rolled in white paper and steamed for 1 hour at 40⁰ C. The sample is allowed to cool down and then washed with cold water to remove the unfixed dyes.
- The silk crepe fabrics is painted with Pantone Shade 15-1621 TPX light Peach, Shade 19-3022 TPX Gloxinia, Shade 19-1218 TPX Potting Red, shade 19-1761 TPX Tango Red, shade 17-0839 TPX Golden Palm, shade 19-0419 TPX Rifle Green, shade 19-0303 TPX jet black.
- The fabrics was painted with Pantone Shade 16-1448 TPX Burnt orange, Shade 19-0915 TPX Coffee Bean, Shade 11-0602 TPX Snow white.
- The silk Crepe Saree was painted with pantone shade 18-4733 TPX Enamel Blue, Shade 19-1860 TPX Prussian Red, Shade 14-6312 TPX Cameo Green, Shade 14-2305 TPX Pink Nectar, Shade 19-4007 TPX Anthro cite.
- The silk chiffon Saree was painted with pantone shade 19-1111 TPX Black Coffee, Shade 18-1664 TPX Fiery Red, Shade 11-0602 TPX Snow white.
- The sample is subjected to calendaring for the final finishing.

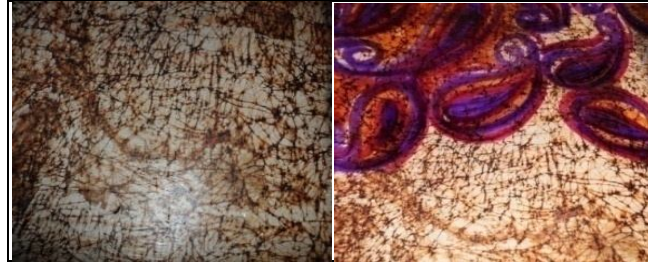


Plate No 2.7: Before And After Painted Sample Using Batik Innovative Technique

2.3. Phase III-Product Development

2.3.1. Standardization of Body Measurements

For Standardization of body measurements, 50 young women of age group 18 -30 years were selected randomly from areas across Bangalore and measured for required body measurement. Emphasis is given to full length, shoulder, bust, arm scye, waist length, waist round, neck width, neck depth, collar circumference, sleeve length and sleeve round. A diagrammatic representation of the right way of taking each measurement is displayed in plate 2.8. The data collected was completed, evaluated and compared with standard measurements.

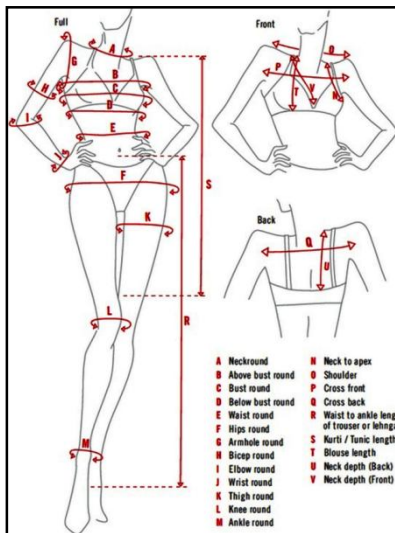


Plate No 2.8: A Diagrammatic Representation of the Right Way of Taking Each Measurement

2.3.2. Designing and Development of Hand Painted Silk Kurtis

Collection of seven each of chiffon and crepe silk Kurtis were designed. The designs incorporated four important factors like comfort, functionality, fit and aesthetic appeal. The designs had various structural details such as frills, princess line, yokes, collar, gathers and fullness. The Kurtis designs were developed from basic patterns by using CAD software. Drafting of the basic Kurti block with sleeve block is shown in appendix III

2.3.2.1(I) Kurti- Design I: Gutta Technique

Fabrics: Silk Crepe

Colour: Riffle Green

Adaptation

- Both the front and back basic pattern block is outlined to well below hip line. A gathered pattern is extended 6 inches from hip line towards bottom hem
- To shape close neck back, the neck line is redrawn 4 1/4 inches inside towards neckline.
- A peter pan collar is constructed.
- A style line is incorporated at mid arm hole line with seam allowance to create a princess line.
- To introduce puff at the top and bottom of the sleeve slash and spread method is used on the basic sleeve block.

Construction

- Join the princess line panels of both front and back separately.
- Join both front and back at shoulder seam.
- Finish the plackets on either side.
- The neck line is finished using the Peter Pan collar.
- Attach the sleeve with gathers at the armhole line.
- Attach both front and back at the side seam.
- Finish the bottom of the sleeve with bias binding and double fold stitching at hem line.

Final Look

- A short Kurti with front opening with Peter Pan collar, gathered sleeve and hem gathers at the bottom and shown in plate

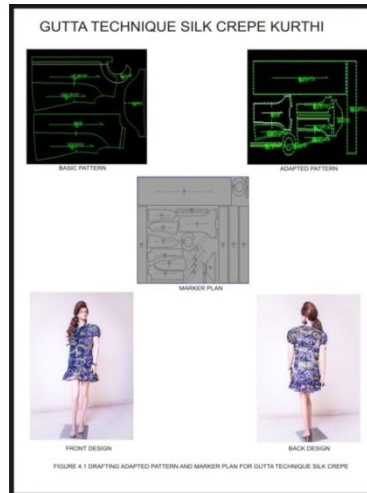


Plate No. 2.9 Final Look of the Kurti Design I

2.3.2.1 (II) Kurti- Design IA: Gutta Technique

Fabrics: Silk Chiffon

Colour: Nugget Gold, Asparagus, Oxford Tan, Blue Shadow, Jolly Green, Calla Green

Adaptation

- Both the front and back basic pattern block is outlined to well below hip line till hemline.
- To shape U neck, the neck line is redrawn on front block.
- To shape diamond shape neck, at the back the neck line is redrawn.
- A collar is constructed.

Construction

- Construct the mandarin collar.
- Finish the necklines with top stitching.
- Armhole is finished with bias binding.
- Join both front and back at shoulder seam.
- The neck line is finished using mandarin collar.
- Join both front and back with side seam with side slit.
- Finish the double fold stitching at hem line.

Final Look

A sleeveless Kurti finished with mandarin collar.

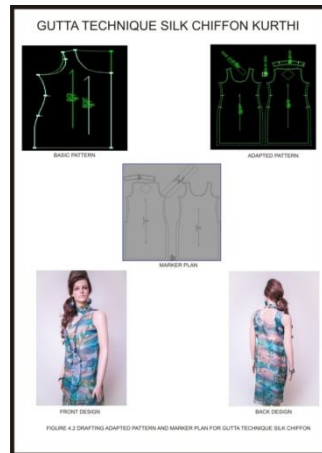


Plate No. 2.10 Final Look of the Kurti Design IA

2.3.2.2 (I) Kurti- Design II: Alcohol Technique

Fabrics: Silk Crepe

Colour: Sun flower, Bison

Adaptation

- Both the front and back basic pattern block is outlined to well below hip line. To adapt shaped round yoke, outline the yoke marking with dotted lines, dividing the patterns into two segments as yoke and bodice segment.
- Bodice segment is extended to 16 inches for creating inverted box pleats.
- To introduce $\frac{3}{4}$ sleeves in a pattern a basic plain sleeve block is extended to 6 inches, excluding cuff length.

Construction

- Construct inverted box pleats of both front and back bodice segment.
- Join the round yoke for both front and back separately.
- Join both front and back at shoulder seam.
- The neck line is finished along with self fabrics loops with bias binding.
- Attach the cuffed sleeve to the armhole line.
- Finish the hem line with double fold stitching.
- Join both front and back with side seams.

Final Look

- A round shaped yoke Kurti incorporated with self looped neckline and fabrics strings, which is emphasized with inverted box pleats with $\frac{3}{4}$ sleeve and cuff opening.



Plate No. 2.11 Final Look of the Kurti Design II

2.3.2.2 (II) Kurti- Design IIA: Alcohol Technique**Fabrics: Silk Chiffon****Colour: Rumba Red****Adaptation**

- Both the front and back basic pattern block is outlined to well below hip line and hem line, it is extended 12.5 inches from hip line to bottom line.
- For the boat neck, reshape the neck width to 3.5 cms towards shoulder.
- To shape and give loose fit to the Kurti the arm hole is redrawn 2 cms below the arm hole.
- 1 inch ease allowance is added throughout the pattern to give a loose fit.

Construction

- Two layers of fabrics are attached to create a bow tie.
- Join both front and back shoulder seam with bow tie attached to the left shoulder and neatly finished.
- Bias binding and double fold stitching is used for neck line, arm hole and hem line.

Final Look

- A long loose fitted sleeve less Kurti with bow tied at the left shoulder.

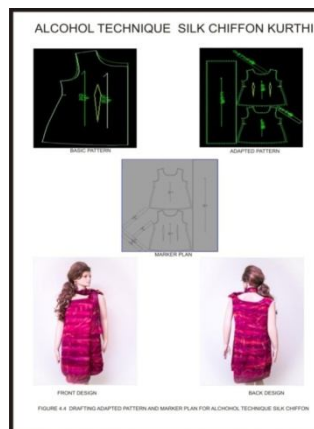


Plate No. 2.12 Final Look of the Kurti Design IIA

2.3.2.3 (I) Kurti- Design III: Salt Technique**Fabrics: Silk Crepe****Colour: Blue Jewel, Nautical Blue****Adaptation**

- Both the front and back basic pattern block is outlined to well above 4 inches from the hem line.
- Trace front block where the double breasted style is extending from left shoulder to right waist line with scoop shape.
- Outline back pattern and draw the dotted lines to show the yoke segment and waist line.
- A basic block is traced to $\frac{3}{4}$ sleeves along with frills.

Construction

- Attach back yoke to bodice with frills.
- Attach back waist with bodice. Finish double breasted components.
- Finish neck line with slant opening.
- Join both front and back at shoulder seam.
- Finish sleeves with frills and attach sleeves to arm hole.
- Bias binding and double fold stitching is used to finish neckline and hem line.
- Join both front and back with side seams.

Final Look

- A double breasted style Kurti with frills at the back and fabrics buttons for ornamentation.

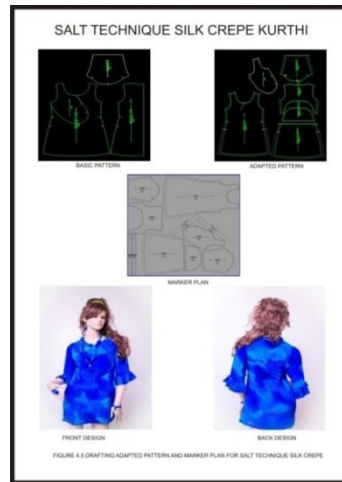


Plate No. 2.13 Final Look of the Kurti Design III

2.3.2.3 (II) Kurti- Design IIIA: Salt Technique

Fabrics: Silk Chiffon

Colour: Classic Blue, Mazarine blue

Adaptation

- Both the front and back basic pattern block is outlined to well below 4 inches towards hem line.
- Both basic front and back bodice are adapted with basic sleeve to achieve Raglan Sleeve.
- Waist line is marked on a basic pattern dividing the Kurti into segment 1 and segment 2

Construction

- Finish neck line with elastic to create gathers.
- Attach yoke with bodice at waist line.
- Raglan sleeve is attached to the bodice along with elastic finish to the edge of the sleeve.
- Finish the bottom with double fold stitching.
- Join both front and back with side seams.

Final Look

- A loose fitted Kurti with Raglan sleeve with square neckline.

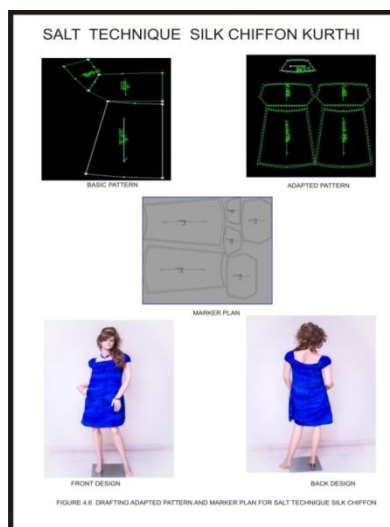


Plate No. 2.14 Final Look of the Kurti Design IIIA

2.3.2.4 (I) Kurti- Design IV: Sugar Technique**Fabrics: Silk Crepe****Colour: Golden Olive, Blue atoll**Adaptation

- Both the front and back basic pattern block is outlined to well below hem line, extending 4” below hem line.
- To shape close neck back, the neckline is redrawn 41/4” inside towards neckline.
- Basic sleeve block is adapted to Puff sleeve at both top and bottom of the sleeve by slash and spread method.

Construction

- Finish neck line with front placket opening.
- Attach front and back shoulder seam.
- Finish neckline with Peter Pan collar.
- Construct sleeve with gathers at the top and bottom of the sleeve.
- Finish the sleeve bottom with band and attach sleeve to bodice.
- Join both front and back with side seams.
- Side slit and hem line is finished with double fold stitching.

Final Look

- A loose fitted Kurti with Peter Pan collar and puffed sleeve.

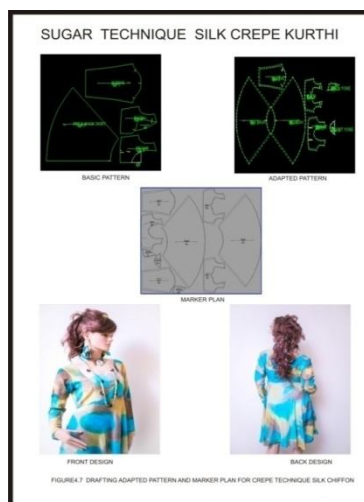


Plate No. 2.15 Final Look of the Kurti Design IV

2.3.2.4 (II) Kurti- Design IVA: Sugar Technique**Fabrics: Silk Chiffon****Colour: Marine Blue, Estate Blue**Adaptation

- Both the front and back basic pattern block is outlined to well below hem line, extending 4” below hem line.
- To shape close neck back, the neckline is redrawn 41/4” inside towards neckline.
- Basic sleeve block is adapted to Puff sleeve at both top and bottom of the sleeve by slash and spread method.

Construction

- Finish neck line with front placket opening.
- Attach front and back shoulder seam.
- Finish neckline with Peter Pan collar.
- Construct sleeve with gathers at the top and bottom of the sleeve.
- Finish the sleeve bottom with band and attach sleeve to bodice.
- Join both front and back with side seams.

- Side slit and hem line is finished with double fold stitching.

Final Look

- A loose fitted Kurti with Peter Pan collar and puffed sleeve.

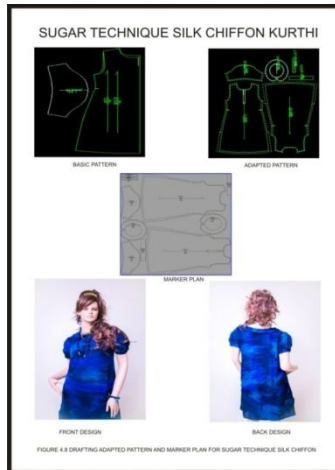


Plate No. 2.16 Final Look of the Kurti Design IVA

2.3.2.5 (I) Kurti- Design V: Water Technique

Fabrics: Silk Crepe

Colour: Apricot Gelato, Avocado, High risk Red

Adaptation

- Both the front and back basic pattern block is outlined to well below hem line, extending 4" below hem line.
- A style line is adapted extending from right shoulder to left side seam, dividing front patterns as yoke segment and bodice segment with slant opening.
- A Basic sleeve block is extended to 7" and adapted to 3/4 sleeves.

Construction

- Join yoke and bodice segments together.
- Finish neck line with front placket opening with bias binding.
- Attach front and back shoulder seam.
- Attach sleeve to bodice.
- Join both front and back with side seams.
- Side slit, sleeve hem and hem line is finished with double fold stitching.

Final Look

- This is an asymmetrical design Kurti- with semi collar folding/ falling towards left neckline, slant front opening, fastened with self fabrics loops and buttons.

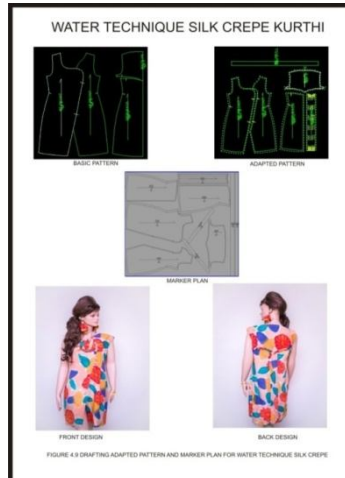


Plate No. 2.17 Final Look of the Kurti Design V

2.3.2.5 (II) Kurti- Design VA: Water Technique

Fabrics: Silk Chiffon

Colour: Rifle Green, Amazon

Adaptation

- Both the front and back basic pattern block is outlined to well below hem line, extending 5” below hem line.
- Both basic front and back bodice are adapted and shoulder line is extended 6” as mega sleeve along with the bodice.
- For both front and back basic neck line is adapted to boat neck shape.

Construction

- Attach front and back shoulder seam.
- Bias binding and double fold stitching is used for neckline, armhole and hem line.
- Join both front and back with side seams.
- A casing of 11/2” fabrics is attached to wrong side of the garment at the waist level.
- A self fabrics cord is inserted through the casing. Stitch around the waist line.
- The cord can be pulled to form gathers and tied in a bow form.
- Side slit and hem line is finished with double fold stitching.

Final Look

- A loose fitted Kurti with Magyar sleeve and adjustable cord at the waist.

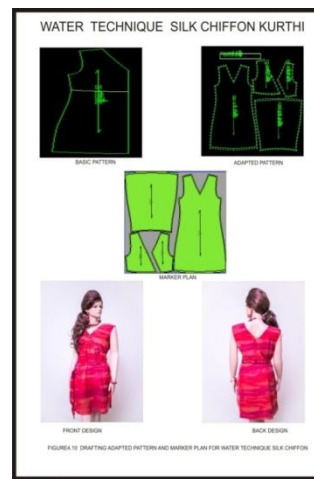


Plate No. 2.18 Final Look of the Kurti Design VA

2.3.2.6 (I) Kurti- Design VI: Urea Technique**Fabrics: Silk Crepe****Colour: Garden Green, Ultra Marine Green, Dress Blue**Adaptation

- Both the front and back basic pattern block is outlined to well below hip line and hem line, extending 4” below hem line, and center cut is marked with dotted line.
- Outline basic back block, and draw a dotted line’s on the back pattern to show the back yoke.
- To get pin tucked flap yoke , trace basic front block with neck line, shoulder line, and arm hole line to get the style design.
- Construct flat collar

Construction

- Finish the flap yokes with pin tucks.
- Finish front placket opening.
- Join centre front and centre back with slit at the bottom.
- Attach front and back shoulder seam.
- Finish neckline with flat collar. (refer app)
- Join both front and back with side seams.
- Finish the armhole with frills
- Side slit and hem line is finished with double fold stitching.

Final Look

- A Pointed flap yoke sleeveless Kurti designed with flat collar.

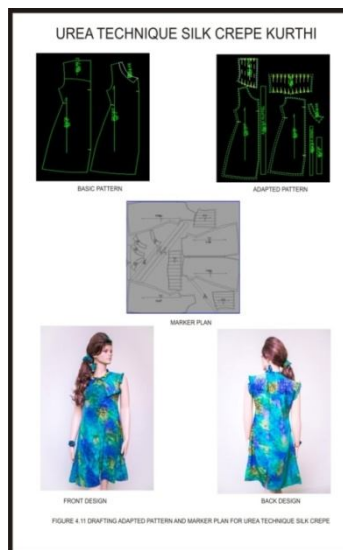


Plate No. 2.19 Final Look of the Kurti Design VI

2.3.2.6 (II) Kurti- Design VIA: Urea Technique**Fabrics: Silk chiffon****Colour: coconut shell, rust, dandelion**Adaptation

- Both the front and back basic pattern block is outlined to well below hip line and hem line with centre front and centre back cut.
- A style line is redrawn with dotted lines both on front and back pattern.
- To U shape both front and back neckline, the neckline is redrawn.

Construction

- A strip of 9 “fabric is constructed into a form of broad tucks.
- Join princess panels both at the front and back
- Join at the centre front and centre back.
- Construct the broad tucks at the waist line with scalloped effect.
- Attach shoulder seam.
- Edge stitching and bias binding is used for neckline and armhole line.
- Join both front and back with side seams.
- Hemline is finished with zigzag stitch

Final Look

- A sleeveless princess style Kurti, finished with broad tucks at the waist line.

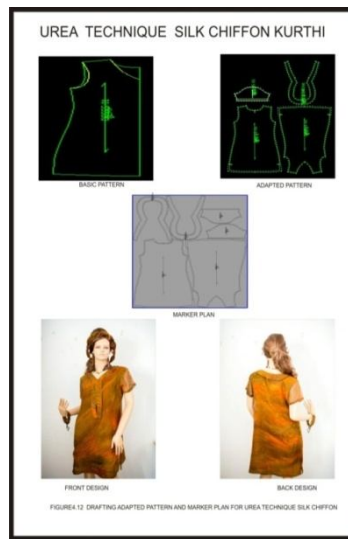


Plate No. 2.20 Final Look of the Kurti Design VIA

2.3.2.7 (I) Kurti- Design VII: Batik Technique

Fabrics: Silk Crepe

Colour: Jet black, rifle green, golden palm, tango red, gloxinia, potting soil, candle light peach.

Adaptation

- Both the front and back basic pattern block is outlined to well below hip line and hem line, extending 3” below hem line.
- To shape close back neckline the neckline is redrawn 2” inside towards neckline.
- To shape close front round neckline, the neckline is redrawn 2.5” inside towards neckline along with front placket.
- Trace basic front block extending the line at center front line 4” to introduce pin tucks.
- Basic sleeve block is outlined using pivot and slash method, to introduce gathers at top, and inverted pleat at bottom.

Construction

- Finish front bodice neckline with pin tucks.
- Attach placket at the center front.
- Join both front and back shoulder seam.
- Construct sleeve with gathers at the top of the sleeve.
- Finish the sleeve bottom incorporating inverted pleats with a band.
- Attach the sleeve to the bodice.
- Join both front and back with side seams.
- Side slit and hem line is finished with double fold stitching.

Final Look

- A round shape neck with pin tucks with puff sleeve finished with front opening.

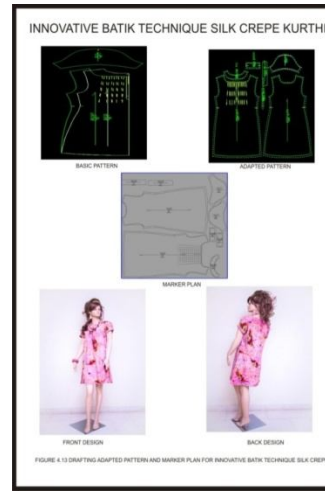


Plate No. 2.21 Final Look of the Kurti Design VII

2.3.2.7 (II) Kurti- Design IV: Batik Technique

Fabrics: Silk Chiffon

Colour: Jet black, rifle green, golden palm, tango red, gloxinia, potting soil, candle light peach.

Adaptation

- Both the front and back basic pattern block is outlined to well below hip line and hem line, extending 3” below hem line.
- To shape close back neckline the neckline is redrawn 2” inside towards neckline.
- To shape close front round neckline, the neckline is redrawn 2.5” inside towards neckline along with front placket.
- Trace basic front block extending the line at center front line 4” to introduce pin tucks.
- Basic sleeve block is outlined using pivot and slash method, to introduce gathers at top, and inverted pleat at bottom.

Construction

- Finish front bodice neckline with pin tucks.
- Attach placket at the center front.
- Join both front and back shoulder seam.
- Construct sleeve with gathers at the top of the sleeve.
- Finish the sleeve bottom incorporating inverted pleats with a band.
- Attach the sleeve to the bodice.
- Join both front and back with side seams.
- Side slit and hem line is finished with double fold stitching.

Final Look

- A round shape neck with pin tucks with puff sleeve finished with front opening.

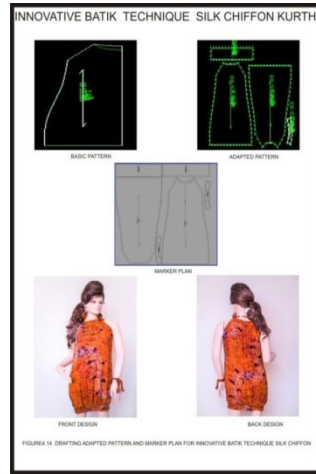


Plate No. 2.22 Final Look of the Kurti Design VIIA

2.3.3. Designing and Development of Hand Painted Saree Blouse

Collection of seven each of Crepe Silk and Silk chiffon Blouse were designed. The designs incorporated four important factors like comfort, fit and aesthetic appeal. The designs had various structural details such as halter necklines, tie ups, frills, princess line yokes, collar, gathers, sleeves such as, petal sleeve, cap sleeve, puff sleeve. The Saree blouse designs were developed from basic patterns by using CAD software. The drafting of basic pattern for blouse is shown in appendix IIIA.

2.3.3.1. Design I Saree Blouse: Gutta Technique

Adaptation

- Both front and back basic pattern block is out lined with four basic darts at front and two basic darts at back.
- To shape back neckline a deep U neckline is redrawn.
- For U shaped front neck. The front neckline is redrawn inside towards centre front placket.

Construction

- Finish the darts.
- Attach waist yokes to choli front.
- Finish the front placket opening.
- Join shoulder seams
- Join side seams. Finish the neckline with bias binding.
- Back bottom is finished with hemming.

Final Look

- This is a sleeveless choli, with deep U shape at the back which is finished with piping using the same fabrics.

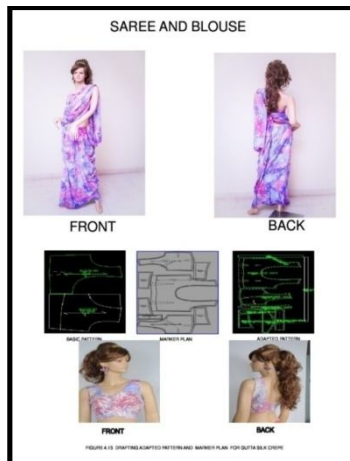


Plate No. 2.23 Final Look of Design I Saree Blouse-Gutta Technique

2.3.3.2. Design II Saree Blouse: Alcohol Technique**Fabrics-crepe****Adaptation**

- Both front and back basic pattern block is out lined with four basic darts at front and two basic darts at back.
- Basic sleeve block is outlined for constructing cap sleeve.
- To shape back neckline to high v-neck, the neckline is redrawn.
- For U shaped front neck. The front neckline is redrawn inside towards centre front placket.
- Construct stand collar

Construction

- Attach floral band to back bottom high v-neckline.
- Finish stand collar.
- Join stand collar to top high v-neckline.
- Finish the darts.
- Attach waist yokes to choli front.
- Finish the front placket opening.
- Join shoulder seams
- Double layer Cap Sleeve is attached to bodice.
- Join side seams. Finish the neckline with bias binding.
- Back bottom is finished with hemming.

Final Look

- This is a cap sleeved choli, with open high V-neck at the back which is finished with stand collar.

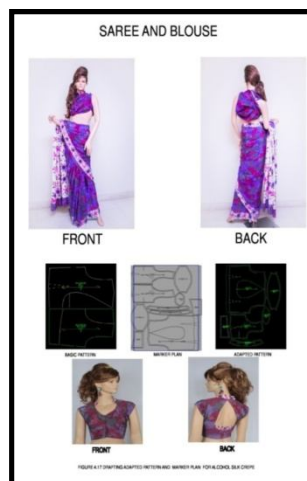


Plate No. 2.24 Final Look of Design II Saree Blouse – Alcohol Technique

2.3.3.3. Design III Saree Blouse: Salt Technique**Fabrics-crepe****Adaptation**

- Both front and back basic pattern block is out lined with four basic darts at front and two basic darts at back.
- Basic sleeve block is outlined for constructing double layered cap sleeve. To shape back neckline to asymmetrical, the neckline is redrawn.
- Back pattern is redrawn to asymmetrical design.
- For U shaped front neck, the front neckline is reshaped.

Construction

- Finish frills.
- Attach asymmetrical segments at the back with double layered frills.
- Finish asymmetrical neckline with bias facing.

- Finish the darts.
- Attach waist yokes to choli fronts.
- Finish the front placket opening.
- Join shoulder seams.
- Double layered Sleeve is attached to bodice
- Join side seams.
- Create fabrics button.
- Fabrics button is emphasized on side of back neckline.
- The front neckline is finished with bias facing.

Final Look

- This is an asymmetrical style choli finished with double layered frills at the back. The choli made more attractive by applying a decorative fastener (fabrics button).



Plate No. 2.25 Final Look of Design III Saree Blouse-Salt Technique

2.3.3.4. Design IV Saree Blouse: Sugar Technique

Adaptation

- Both front and back basic pattern block is out lined with four basic darts at front and two basic darts at back.
- Basic sleeve block is outlined for constructing bell sleeve.
- To shape back neckline to asymmetrical design, the neckline is redrawn.
- For U shaped front neck, the front neckline is reshaped.

Construction

- Attach asymmetrical segments at the back.
- Finish asymmetrical neckline with scalloped effect which is finished with piping.
- Finish back neckline with piping.
- Attach yokes to back bodice.
- Finish the darts.
- Attach waist yokes to choli front.
- Finish the front placket opening.
- Join shoulder seams.
- Sleeve is attached to bodice
- Join side seams.
- Construct the fabrics loops to attach to the back neckline.
- The front neckline is finished with piping.

Final Look

- This is an asymmetrical designed choli with bell sleeves, and the back neckline is finished with loops.

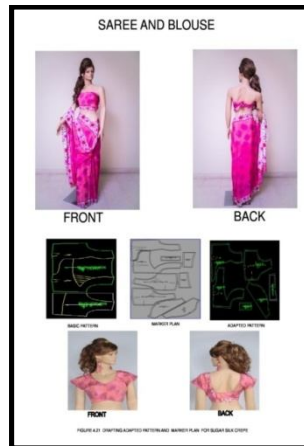


Plate No. 2.26 Final Look of Design IV Saree Blouse-Sugar Technique

4.3.3.5. Design V Saree Blouse: Water Technique

Fabrics-crepe

Adaptation

- Both front and back basic pattern block is out lined with four basic darts at front and two basic darts at back.
- Basic sleeve block is outlined for constructing cap sleeve.
- To shape back neckline to asymmetrical design, the neckline is redrawn.
- Construct asymmetrical designed yokes at the back.
- For U shaped front neck, the front neckline is reshaped and redrawn.

Construction

- Finish both asymmetrical slanting yokes with bias piping.
- Finish back neckline with piping.
- Attach yokes to back bodice.
- Finish the darts.
- Attach waist yokes to choli fronts.
- Finish the front placket opening.
- Join shoulder seams.
- Sleeve is attached to bodice.
- Join side seams.
- Stitch the tie up bow string.
- Bow string is emphasized with coloured wooden beads.
- The front neckline is finished with tie up string with piping.

Final look

- This is an asymmetrical designed choli with cap sleeve. And the neckline is finished with bow string for a perfect fit.

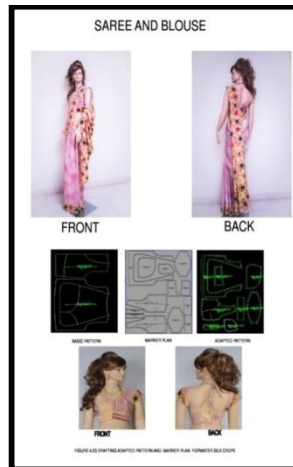


Plate No. 4.27 Final Look of Design V Saree Blouse –Water Technique

4.3.3.6. Design VI Saree Blouse: Urea Technique

Fabrics-crepe

Adaptation

- Both front and back basic pattern block is out lined with four basic darts at front and two basic darts at back.
- Basic sleeve block is outlined.
- Slash the upper section and the lower section of the sleeve block to introduce fullness.
- To shape back neckline the neckline is redrawn.
- For U shaped front neck, the front neckline is reshaped.

Construction

- Finish the darts.
- Attach waist yokes to choli fronts.
- Finish the front placket opening.
- Join shoulder seams.
- Sleeve is attached to bodice with fullness.
- The bottom of the sleeve is finished with band.
- Join side seams.
- Finish the neckline with piping.
- A tie up string is attached at the back for fit.

Final look

- This is a puff sleeved choli , with high U-shaped neckline finished with tie string.

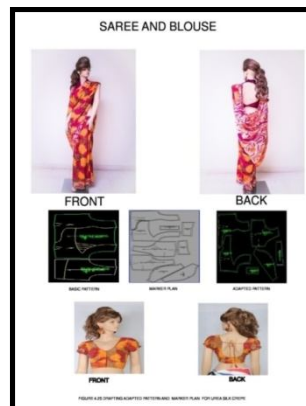


Plate No. 2.28 Final Look of Design VI Saree Blouse-Urea Technique

2.3.3.7. Design VII Saree Blouse: Batik Technique

Fabrics-crepe

Adaptation

- Both front and back basic pattern block is out lined with four basic darts at front.
- Basic sleeve block is outlined for constructing cap sleeve.
- To shape back neckline to wider pot -neck, the neckline is redrawn.
- For U shaped front neck. The front neckline is redrawn towards centre front placket.
- Construct frills

Construction

- Finish back wider pot neckline with bias facing.
- Attach a scalloped band which is finished with printed frills.
- Finish the darts.
- Attach waist yokes to choli front.
- Finish the front placket opening.
- Join shoulder seams
- Cap sleeve bottom is finished with Double layer frills.
- Cap Sleeve is attached to the bodice.
- Join side seams.
- Finish the neckline with bias binding.
- Back bottom is finished with hemming.
- The back is finished with tie up strings.

Final look

- This is a frilled cap sleeved choli, with wider pot neckline at the back which is finished with a tie up string for a good fit.

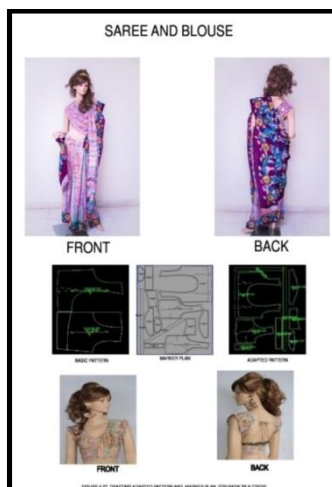


Plate No. 2.29 Final Look of Design VII Saree Blouse-Batik Technique

2.3.3.8. Design VIII Saree Blouse: Gutta Technique

Fabrics – Chiffon

Adaptation

- Front basic pattern block is adapted with princess line, with bias broad V shaped strap neckline.
- Back basic pattern block is out lined with two basic darts, with alter neckline.

Construction

- Attach the princess line panels to front.
- Finish the darts.
- Attach bias broad V shaped strap for both front and back neckline.
- Join shoulder seams.

- Join side seams.
- Finish the placket opening at back.

Final look

- This is a designer princess line style choli with bias V shaped neckline and opening at the back.



Plate No. 2.30 Final Look of Design VIII Saree Blouse-Gutta Technique

2.3.3.9. Design IX Saree Blouse: Alcohol Technique

Fabrics-Chiffon

Adaptation

- Both front and back basic pattern block is out lined with bustier style, with two darts.
- Back pattern is adapted with asymmetrical line.
- Adapt the broader shoulder straps.

Construction

- Construct the front bustier with two darts.
- Construct the back bodices with asymmetrical opening.
- Construct a broader shoulder straps with gathers.
- Attach the straps at front continued at the back.
- Finish the back placket opening.
- Join side seams.
- Decorative fabrics bow is attached at back opening.

Final look

- This is a bustier style choli, finished with asymmetrical back opening, with broad gathered shoulder straps. The choli is incorporated with decorative fabrics bow.

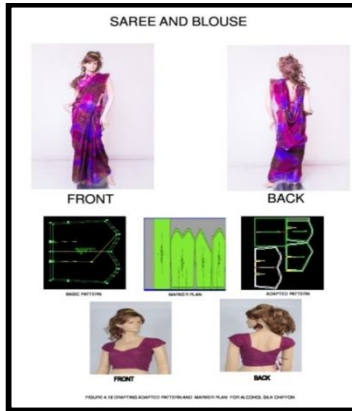


Plate No. 2.31 Final Look of Design IX Saree Blouse-Alcohol Technique

2.3.3.10. Design X Saree Blouse: Salt Technique

Fabrics- Chiffon

Adaptation

- Both front and back basic pattern block is out lined with four basic darts at front and two basic darts at back.
- The back neckline is redrawn to 'V' shape.
- Back pattern is redrawn to create asymmetrical pin tucks from left shoulders to right side seam.
- The front neckline is reshaped from basic to pentagon.

Construction

- Construct asymmetrical series of pin tucks with an equidistance of 1cms at the back.
- Finish 'V' neckline with fitted facing at the back.
- Finish the darts.
- Attach waist yokes to choli fronts.
- Finish the front placket opening.
- Join shoulder seams.
- Join side seams.
- Create fabrics flower with strings, attached at front bodice on the right shoulder.
- The front neckline is finished with bias facing.
- The placket is finished with hook and eye.

Final look

- This is a symmetrical style choli finished with asymmetrical pin tucks at the back. The choli is incorporated with decorative fabrics flower at the front shoulder for decoration.

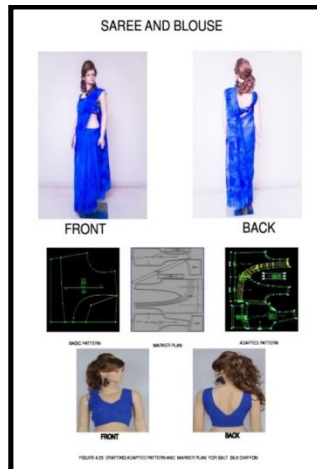


Plate No. 2.32 Final Look of Design X Saree Blouse-Salt Technique

2.3.3.11. Design XI Saree Blouse: Sugar Technique**Fabrics- Chiffon****Adaptation**

- Front basic pattern block is adapted with princess line.
- Back basic pattern block is out lined with basic darts.
- Both front and back patterns are adapted with graduating pin tucks at the shoulder.
- To shape back neckline to deep U, the neckline is redrawn.
- For leaf shaped front neck, the front neckline is reshaped.

Construction

- Construct front bodice with princess line.
- Finish the front neckline with shaped facing.
- Finish the back with placket opening.
- Finish back neckline with facing.
- Finish the darts.
- Join shoulder seams.
- Construct graduating pin tucks at both front and back shoulder, with elastic.
- Join side seams.

Final look

- This is a sleeveless princess line designed choli, with graduating pin tucks emphasizing at shoulder, with back opening.

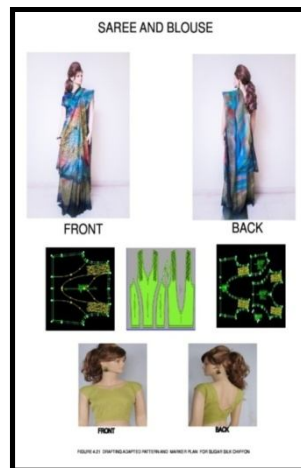


Plate No. 2.33 Final Look of Design XI Saree Blouse-Sugar Technique

2.3.3.12. Design XII Saree Blouse: Water Technique**Fabrics-Chiffon****Adaptation**

- Front basic pattern block is adapted with princess line
- Back basic pattern block is out lined with two basic darts.
- Basic sleeve block is outlined for constructing sleeve.
- The back neckline is redrawn to deep 'V' shape, with back opening.
- For U shaped front neck, the front neckline is reshaped and redrawn.

Construction

- Back neckline is finished with 1" width of transparent effect throughout the 'V' shape.
- Finish the back darts.
- Finish the back placket opening, with fabrics bow.
- Construct the princess line at front.
- Front neckline is finished with 1" width of chiffon fabrics to give a transparent effect throughout the 'U' shape.
- Join shoulder seams.

- Sleeve is attached to bodice.
- Join side seams.
- The front neckline is finished with tie up string with piping.

Final look

- This is a princess line designer choli, with transparent neckline at both front and back, with a bow incorporated to tie at the back.



Plate No. 2.34 Final Look of Design XII Saree Blouse-Water Technique

2.3.3.13. Design XIII Saree Blouse: Urea Technique

Fabrics-Chiffon

Adaptation

- Front basic pattern block is adapted with princess line.
- Neckline is adapted with Chinese collar
- Back basic pattern block is out lined with two basic darts, along with broad keyhole neckline.

Construction

- Construct the princess line at front.
- Finish the back darts.
- Finish the back neckline with facing.
- Join shoulder seams.
- Contract the chinese collar and attach to the neckline.
- Join side seams.
- Finish the placket opening at back.

Final look

- This is a princess line designer choli, emphasized with Chinese collar along with back opening & broad key hole neckline.



Plate No. 2.35 Final Look of Design XIII Saree Blouse-Urea Technique

2.3.3.14. Design XIV Saree Blouse: Innovative Batik Technique

Fabrics – Chiffon

Adaptation

- Front basic pattern block is adapted with princess line.
- For U neckline, the front neckline is redrawn.
- Basic sleeve block is outlined for constructing full sleeve.
- To shape back neckline to wider pot-neck, the neckline is redrawn.

Construction

- Finish back wider pot neckline with bias facing.
- Construct the princess line at front.
- Finish the front neck line with facing.
- Join shoulder seams
- Construct the full sleeves and attach to the bodice
- Join side seams.
- The back is finished with tie up strings.

Final look

- This is a full sleeved princess line choli, with wider pot neckline at the back which is finished with a tie up string for a good fit.



Plate No. 2.36 Final Look of Design XIV Saree Blouse-Innovative Batik Technique

2.3.4. Designing and Development of Hand Painted Fabrics Accessories

Collection of hand painted Crepe Silk and Silk chiffon fabrics accessories were designed and developed. The designs incorporated four important factors like comfort, style, aesthetic appeal and trendy. The hand crafted accessory collection consists of seven each of Crepe Silk and Silk chiffon accessory for both Kurti's and sarees were designed and developed. The designs had various structural details such as neck laces, chokers, long necklaces, ear studs, ear rings, danglers, wrist bands. The accessory designs were developed using hand painted fabrics pieces with various eco-friendly materials like wood, wooden beads, pearls, coloured threads, brass beads. The accessory designs were hand crafted which is sustainable.

2.3.4.1. Design I: Gutta Technique

Fabrics –Crepe Silk

Neck wear

- The neck wear is made from the cut waste fabrics of the garment. It is a long fabrics neck Chain.
- The fabrics are cut into rectangular piece and the edge is finished. Grey and golden plastic beads are inserted to hold the fabrics together and create contemporary design.
- Metal Concentric circular plate is inserted on either side and later, attached with flower made of painted fabrics and decorated with engraved plastic bead.
- The raw edges are covered with bell shaped metal drops, later it is finished with jump ring and clasp to lock.

Ear wear

- The flowers are made with waste fabrics which has five petals.
- First to make one earring we need 5 piece of diamond shaped cut fabrics and they are joined together to make a single flower.
- The petals are held together at the center with Kundan bead on one side and plastic round bead on the other side.
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A rectangular piece of fabrics is taken and stitched as a flat strip; a similar kind of flower is attached to the center of the wrist band.
- The raw edges at the corners are finished with bell shaped metal drops and finished with jump ring and clasp to lock.



Plate No. 2.37 Final Look of Accessory – Design I

2.3.4.1(I) Design IA: Gutta Technique

Fabrics – Silk Chiffon

Neck wear

- The neck wear is made from the cut waste fabrics of the garment. It is a long fabrics neck Chain.
- The fabrics are cut into straight pieces and the edge is finished with zigzag. White Pearls are used with metal wire to form a loop to hold the fabrics together.
- A bow is created with the same fabrics at the bottom and white pearl loops are attached every 4 inches to hold the fabrics together which creates a contemporary design.
- The raw edges at the end of the chain are finished with plastic beads with metal finish, later it is finished with jump ring and clasp to lock.

Ear wear

- The dangler is made using a square piece of waste fabrics which is held at the center and grouped together with a gold pollen wire to tightly hold the fabrics together.
- The fabrics are held together with a post at the center with pearl bead at the center of the dangler.
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A squash blossom type of bracelet is made with a straight piece of fabrics; the raw edge is neatly finished with Zigzag.
- The fabrics is attached with jump ring, is tightly wound around the fabrics with pearl and Meenakari tubes on posts to create metal tassels to give a contemporary look.
- The raw edges at the corners are finished with pollens wound round and finished with jump ring and clasp to lock.



Plate No. 2.38 Final Look of Accessory – Design IA

2.3.4.2. Design II: Alcohol Technique**Fabrics – Crepe Silk****Neck wear**

- The neck wear is made from the cut waste fabrics of the garment. It is a long fabrics neck Chain.
- The fabrics are cut into 30 inch rectangular piece and the edge is finished with zigzag. Wine coloured oval shaped wooden beads are used to hold the fabrics at the center together.
- The raw edges at the end of the chain are finished with brown coloured plastic beads with metal finish, later it is finished with jump ring and clasp to lock.

Ear wear

- The dangler is made using a disc shaped wooden holder which hold the fabrics as a drop and a carved circular plastic bead is fixed to hold the fabrics and the circular disc. The raw edge is finished with grey coloured plastic bead.
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A rectangular piece of fabrics is folded to cover the raw edges and four light brown pearls are strung to a post which is again attached to the fabrics with the help of pollens.
- The raw edges at the corners are finished with pollens wound round and finished with jump ring and clasp to lock.



Plate No. 2.39 Final Look of Accessory – Design II

2.3.4.2 (I) Design IIA: Alcohol Technique**Fabrics – Silk Chiffon**

Neck wear

- The neck wear is made from the cut waste fabrics of the garment. It is a choker made with 15 inch long rectangular fabrics which is flat and a self fabrics flower is attached to one end of the rectangular strip of the fabrics where a triangular metal piece is attached with conical drop to give it a contemporary look.
- The edges at the end of the choker are finished with jump ring and clasp to lock.

Ear wear

- The dangler is made using a square piece of waste fabrics which is held at the center and grouped together at the center with triangular metal piece which is attached with conical drop
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A rectangular piece of fabrics is twisted and knotted at the center to give a finished look and a conical drop is attached to the knot.
- The raw edges at the corners are finished with plastic silver coloured bead, jump ring and clasp to lock.



Plate No. 2.40 Final Look of Accessory – Design IIA

2.3.4.3. Design III: Salt Technique**Fabrics – Crepe silk****Neck wear**

- The neck wear is made from the cut waste fabrics of the garment. It is a long chain made with 48 inch long rectangular fabrics which is twisted to cover the raw edges. The centre of the chain is folded and held with brown colour plastic bead, again for every five inch two golden colour plastic beads are attached to give a contemporary look.
- The edges of the choker are finished with jump ring and clasp to lock.

Ear wear

- The dangler is made using a square piece of waste fabrics which is twisted and turned and held with brown colour plastic bead with steel rings at the end. The top portion of the earring is finished with the support of a bead with the combination of blue and black colour.
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A rectangular piece of fabrics of 8 inch is twisted and knotted in three different places with the distance of 1 and half inch each. A golden colour plastic bead is inserted between the knots, to give a stylish look.
- The raw edges at the corners are finished with pollens wound round and finished with jump ring and clasp to lock.



Plate No. 2.41 Final Look of Accessory – Design III

2.3.4.3 (I) Design IIIA: Salt Technique

Fabrics – chiffon silk

Neck wear

- The neck wear is made from the cut waste fabrics of the garment. It is a long chain made with 30 inch long rectangular fabrics which is made into a strip. The centre of the chain is attached with two thin strips of self fabrics which are sewn together crosswise. A blue color beaded bead is attached at the centre.
- The edges at the end of the choker are finished with jump ring and clasp to lock.

Ear wear

- The dangler is made using a square piece of waste fabrics, which is made into a strip of 2 inches. The fabrics jewellery is supported with the blue colour beaded bead with the help of jump ring.
- The edges are finished with jump ring and clasp to lock.

Bracelet

- A rectangular piece of fabrics of 8 inch is made into a flat strip; the center of the bracelet is finished with a blue colour beaded bead.
- The raw edges at the corners are finished with jump ring and clasp to lock.



Plate No. 2.42 Final Look of Accessory – Design IIIA

2.3.4.4. Design IV: Sugar Technique

Fabrics – Crepe silk

Neck wear

- The neck wear is made from the cut waste fabrics of the garment. It is a long chain made with 30 inch long rectangular fabrics which made into a thin strip. The centre of the chain is attached with locket holder, with three pink colour beads strung in post. At the distance of every 5 inch length two knots incorporated, a big pink colour bead is attached at the centre of two knot.
- The edges of the chain are finished with jump ring and clasp to lock.

Ear wear

- The dangler is made using a square piece of waste fabrics which is finished with zigzag. One corner is pulled and inserted with a long cream colour wooden bead supported with big pink colour wooden bead and a pink colour pearl.
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A rectangular piece of fabrics of 8 inch is twisted to cover the raw edges. The centre of the bracelet is inserted with pinkish brown coloured square bead, with the help of post.
- The raw edges at the corners are finished with pollens wound round and finished with jump ring and clasp to lock.



Plate No. 2.43 Final Look of Accessory – Design IV

2.3.4.4(I) Design IVA: Sugar Technique

Fabrics – chiffon silk

Neck wear

- The neck wear is made from the cut waste fabrics of the garment. It is a choker made with 30 inch long rectangular fabrics which is made into a strip. The centre of the chain is attached with golden stone bead, and on either side 15 knots are incorporated continuously to give a string effect.
- The raw edges at the corners are finished with pollens wound round and finished with jump ring and clasp to lock

Ear wear

- The dangler is made using a long piece of waste fabrics, and made into a strip of 2 inches. The centre of the strip is inserted with green colour beaded bead; the rest of the strip is taken in either sides of the beaded bead and finished with pollens.
- The edges are finished clasp to lock.

Bracelet

- A rectangular piece of fabrics of 12 inch is made into a strip, and it is twisted throughout and finished with pollens and jump ring. The other side is held with two green colour beaded bead, with the help of posts and jump ring.
- To give a finishing touch to the fabrics jewellery clasp is used.



Plate No. 2.44 Final Look of Accessory – Design IVA

2.3.4.5. Design V: Water Technique

Fabrics – Crepe silk

Neck wear

- The neck wear is made from the cut waste fabrics of the garment. It is a long squash blossom chain made with 40 inch long rectangular fabrics which made into a flat strip. The centre of the chain is attached with oval chocolate brown colour flat drop with the help of post. At the distance of every 3 inch length, diamond shaped chocolate brown colour wooden bead is attached with the help of silver colour post.
- The edges at the end of the chain are finished with engraved black colour wooden bead, jump ring and clasp to lock.

Ear wear

- The dangler is made using a circular piece of waste fabrics which is left unfinished. The centre of the circular piece is pulled and inserted into a bell shaped wooden drop. Two strings of circular shaped red and orange colour strings are attached.
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A rectangular piece of fabrics of 8 inch made into a thin strip. At the distance of every one and half inch a square shaped yellow colour bead and sugar bead are attached with the help of posts, to give a squash blossom look.
- The raw edges at the corners are finished silver colour engraved bead, jump ring and clasp to lock.



Plate No. 2.45 Final Look of Accessory – Design V

2.3.4.5(I) Design VA: Water Technique**Fabrics – chiffon silk****Neck wear**

- The neck wear is made from the cut waste fabrics of the garment. It is a choker made with 30 inch long rectangular fabrics which is made into a strip which is twisted throughout. 4 wooden rings are inserted at the centre with the distance of one inch.
- The raw edges at the corners are finished with golden colour metal bead, jump ring and clasp to lock.

Ear wear

- The dangler is made using a long piece of waste fabrics, and made into a strip of 2 inches, which is twisted throughout and finished with brown colour wooden bead. The other edge is hung with big chocolate brown colour bead with the help of golden colour post.
- The edges are finished with clasp to lock.

Bracelet

- Two rectangular pieces of fabrics of 4 inch is made into a strip. A wooden ring is placed at the centre and in either side it is held with fabrics strip, which are supported with golden colour metal bead and pollen at the distance of one inch.
- The raw edges at the corners are finished with pollens wound round and finished with jump ring and clasp to lock.



Plate No. 2.46 Final Look of Accessory – Design VA

2.3.4.6. Design VI: Urea Technique**Fabrics – Crepe silk**

Neck wear

- The neck wear is made from the cut waste fabrics. It is a choker made of 14 inch rectangular fabrics which is made into a flat strip, width of 4 inch. At the centre of the choker, a red, orange and yellow wooden beads are grouped together to form a bunch.
- A rectangular piece of fabrics is cut using pinking shears and a red bead is attached to it to create a contemporary style.
- The edges at the end of the chain are finished with jump ring and clasp to lock.

Ear wear

- The dangler is made using a rectangular piece of waste fabrics; the raw edges are finished with pinking shears. The centre of the rectangular piece is pulled and inserted into a round shaped wooden bead and attached with red bead using a post.
- A jump ring with clasp is attached to give a finishing touch.

Bracelet

- A rectangular piece of fabrics of 8 inch length is stitched into a thin strip. At the distance of one and half inch a row of 4 colour beads is stitched in straight line. At the distance of 2 inch from the centre, a square piece of raw edges are finished with pinking shears and attached with red bead in the centre for decoration.
- The raw edges at the corners are finished silver colour engraved bead, jump ring and clasp to lock.



Plate No. 2.47 Final Look of Accessory – Design VI

2.3.4.6 (I) Design VIA: Urea Technique**Fabrics – Chiffon Silk****Neck wear**

- The neck wear is made from the cut waste fabrics. It is a short chain made with 30 inch long rectangular fabrics which is made into a strip and twisted throughout, 4 wooden Beads are inserted at the centre with the distance of one inch to hold the fabrics. Pearls are strung into an elastic wire and are attached to the center.
- The raw edges at the corners are finished with silver colour plastic bead, jump ring and clasp to lock

Ear wear

- The dangler is made using a long piece of waste fabrics, and made into a strip of 2 inches, which is inserted into an oval wooden piece. A brass bead is inserted to hold the fabrics throughout and finished with brown colour wooden bead. The edges are finished with clasp to lock.

Bracelet

- A rectangular piece of fabrics of 4 inch is made into a strip. A wooden ring is placed at the centre and on either side it is held with wooden bead to hold the fabrics.
- The raw edges at the corners are finished with jump ring and clasp to lock.



Plate No. 2.48 Final Look of Accessory – Design VIA

2.3.4.7. Design VII: Batik Technique

Fabrics – Crepe Silk

Neck wear

- The neck wear is made from the cut waste fabrics. It is a choker made with 14 inch long rectangular fabrics which is held on to a circular metal rings inserted at the centre with the distance of one inch to hold the fabrics.
- On the other side metal coins and bell shaped drop and beaded bead is used to finish the choker.

Ear wear

- The dangler is made using a long piece of waste fabrics, and made into a strip of 2 inches, which is inserted into an oval engraved plastic bead. A flat brass bead is inserted to hold the fabrics throughout with a help of a post to create a bell shaped effect on the fabrics.
- The edges are finished with clasp to lock.

Bracelet

- Two rectangular pieces of fabrics of 4 inch is stitched and made into 2 strips. A metal round ring is placed at the centre and on either side it is held with the fabrics to hole the metal rings.
- The raw edges at the corners are finished



Plate No. 2.49 Final Look of Accessory – Design VII

2.3.4.7 (I) Design VIIA: Batik Technique

Fabrics –Silk chiffon

Neck wear

- The neck wear is made from the cut waste fabrics. It is a long chain made with 14 inch long rectangular fabrics which is held with brown coloured wooden bead on either side equally.
- On the either side wooden tubes are incorporated to hold the fabrics tightly and lock it.
- The raw edges are finished with a loop using self fabrics.

Ear wear

- The dangler is made using a square piece of waste fabrics. The fabrics are finished with zigzag to cover the raw edges. The fabrics are picked from the middle and the fabrics are held with round wooden bead to create a drops effect of fabrics.
- The edges are finished with clasp to lock.

Bracelet

- Rectangular piece of fabrics of 4 inch is stitched and made into 2 strips. The fabrics are held together with the help of pollen.
- The raw edges at the corners are finished with clasp and jump ring



Plate No. 2.50 Final Look of Accessory – Design VIIA

2.4. Phase IV – Evaluation and Testing of Finished Product

2.4.1. Conditioning and Preparation of the Samples for Testing

The samples both silk chiffon and silk crepe were conditioned prior to testing and standard atmospheric condition of 65± 2% and 25 ± 2°C temperature was maintained during testing as per IS 6359 – 1971.

2.4.2. Testing

2.2.1. Determination of Basic Geometric Properties of Fabrics

The silk chiffon and crepe silk fabric were tested for basic geometrical properties as shown in the Table 2.2.

Geometric properties	Ends per Inch	Picks per Inch	Fabrics Weight (GSM)	Fabrics Thickness (mm)	Yarn Count	
					Warp	Weft
Greige	104	85	40	0.14	230	162
Chiffon	104	85	38	0.14	230	162
Greige	168	100	60	0.18	262	144
Crepe	168	100	58	0.18	262	144

Table 2.2 Geometric Properties of Silk Chiffon and Silk Crepe

2.4.2.1(I) Threads Per Inches

Thread per unit length in inches was determined as per IS 1963-1981

It was measured by using counting glass. The determination of fabrics count measures the number of warp yarns per inch and the number of weft yarns per inch. The fabrics count is the number of warp and weft yarns per unit distance while the fabrics is held without tension and is free from folds and wrinkles. The counting glass is a small magnifying glass in a stand over a square exactly one inch each way. The number of threads in the field directly gives the number of threads per inch. The number of ends and picks per inch should be counted in five different places, not counting the same threads twice and of course not near the selvedge because the spacing of the threads near selvedge is often a little different than in the body of the cloth.

2.4.2.1 (II) Yarn Count: (Length Per Unit WT –IS: 3442-1980)

This was determined using “Beesley Balance”, Beesley balance works on the principle of fixed weight and fixed length system. With the help of the sizing template provided, two parallel lines on the fabrics are marked. The fabrics is cut along these two lines and the yarns are removed from the fabrics with the help of pointing needles. The center beam is balanced against the datum line. Once the center beam is balanced, place one Calibrated Rider in the slot provided on the center beam of the balance. The yarn from the fabrics is placed one by one on the suspender Hook of the center beam, till the center beam is balanced.

2.4.2.1 (III) Fabrics Thickness (MM)

The paramount thickness gauge was used to determine the thickness of the fabrics samples. The pressure foot and anvil were cleaned by drawing some clean paper between them. After cleaning the gauge was set to 0. The test sample was conditioned for 24 hours in a

standard atmosphere. The gauge reading was noted at ten different places on the sample. While taking the readings care was taken to see that each place contains different warp and weft threads.

2.4.2.1 (IV) Fabrics Weight per Square Meter (G/M²)

The weight per square meter of the fabrics was determined as per IS: 1963:1981(RA2004)

Fabrics weight is an important factor for international selling and buying highlights Basu (2004).the weight of the fabrics was expressed in grams per square meter. GSM cutter was used to cut circular specimen of 100 square centimeter of a fabrics very accurately. It has 4blades that cut the fabrics when the hand wheel was rotated by applying light pressure. The samples were cut and weighed accurately using digital balance having 0.01sensitivity, the values obtained directly from the readings on the balance. The value in grams, multiplied by hundred gives, grams per square meter of the fabrics. Ten readings were recorded and the mean was calculated. The same procedure was followed in ten different samples to find the fabrics weight of the original and painted sample. And an average of five measurements was expressed as weight per square meter.

2.4.2.2. Determination of Comfort Properties

2.4.2.2 (I) Determination of Drape Coefficient (IS 8357-1977)

Fabrics drape is one of the visual components in the aesthetic assessment of fabrics. The drape coefficient of the fabrics depends on many factors such as weave, cover factor. It is defined as the deformation of the fabrics reduced by the gravity. In this experiment, a circular piece of fabrics is held by two small circular plates so that its free edges drapes down under its own weight. Raise the Hinged Acrylic sheet. Place one ammonia process paper; face up. Over the resilient black sheet below the acrylic sheet. Lower the acrylic sheet so that it sits firmly on the paper. Lower the test specimen holder assembly with test specimen gently over the specimen supports such that the head of the bolts sits in the hole at the center of the test specimen support. Switch on the halogen lamp tube. Allow the paper to get exposed for a period of ten to twelve min. Open the door of the developing chamber below the exposing chamber. Keep the ammonium hydroxide bottle in the developing chamber with its cap removed. Remove the exposed paper from the exposing chamber and place it with the exposed face down. The outline of the exposed area on the paper will be slightly hazy or diffused because of divergence of light rays. Draw by freehand a smooth curve through the center of the diffused areas. Condition the paper to moisture equilibrium in standard atmosphere. Cut out the drape pattern with a pair of scissors and determine its mass in gram correct to two decimal places. Determine the mass per unit area of the paper used by cutting a known area of the original paper and weighing. Reverse the specimen and obtain the drape pattern with other surface upwards. The procedure is repeated for five samples.

Area of Drape Pattern (D) = K x w/W

Where, K = Correction factor for divergence of light rays (=0.91)

w = Mass of Drape pattern

W = Mass of Ammonia process paper in Grams per square cm.

From the value of D determined above, calculate the drape coefficient (F) for the test specimen as below:

DRAPE CO-EFFICIENT F % = [(D-a)/ (A-a)] x100

Where, a = area of supporting stand of 12.25 cm diameter (122.8cm²)

A= area of test specimenof25cmdiameter (491.1cm²)

2.4.2.3. Determination of Performance Properties

2.4.2.3 (I) Colour Fastness Tests

Colour fastness measures the resistance of the textiles when they are exposed to various agencies. The grey scale employed for colour fastness test is 1-5 grade, reports Smith (2006). The fabrics samples painted with the ecofriendly acid colours was subjected to various tests for fastness to washing, rubbing (dry & Wet), light, perspiration and dry cleaning.

2.4.2.3 (II) Colour Fastness to Washing

As per ISO: 105 C-10 A (1)-2006. Temperature- 40°C, Soap Solution – 5g /liter,

MLR - 1:100, Time -30 minutes

The fastness of the painted fabrics for fastness to colour change and staining was done by using Laundrometer instrument. In this process samples were mechanically agitated under specified conditions of time, temperature in soap, then rinsed and dried. *The painted fabrics samples were cut 100 mm x 40 mm size.* The testing samples were kept in contact with specified adjacent fabrics. *The samples were attached in between the white cotton fabrics and sewn them along four sides.* The whole mass was weighed using the balance to aid accurate liquor ratio volume. Soap solution was prepared by using 5gms of soap per liter of water. Machine is operated by closing the container at the temperature of 40°C for 30 minutes. The temperature of the water bath was thermostatically controlled. Timing was started immediately after closure of the containers. The containers assembly was rotated at a frequency of 40 ±2 r/min. At the end the samples were removed, rinsed and extracted the excess of water. The samples were dried in air at a

temperature not exceeding 50°C. The change in colour of the specimen and the staining of the adjacent fabrics were assessed with reference to the original fabrics using grey scales.

2.4.2.3 (III) Colour Fastness to Rubbing

Rubbing fastness of the painted fabrics was tested as per (IS 766: 1988) (RA 2004).

Rubbing fastness was determined by using crock meter instrument. The test specimen was cut to a size of 14 x 5cm for dry rubbing and 2 pieces for wet rubbing. One specimen of each pair has the long direction parallel to the warp yarns and other parallel to the weft or filling yarns. The test specimen was fixed to the rubbing device by means of clamps such that the long direction of the specimen follows the track of the device. The samples were tested according to requirement. For dry rubbing the cloth is placed flat in place over the end of the finger of the testing device and fixed in a straight line along a track 10 cm long on the dry specimen, 10 times to and in 10 seconds, with a downward force on the finger. For wet rubbing wetted sample was rubbed same as dry rubbing. Assess the staining of the rubbing with the grey scale.

2.4.2.3 (IV) Colour Fastness to Perspiration: (IS: 971:1983) (RA2004)

The colorfastness to perspiration was tested by using Perspirometer. The apparatus consists of a frame of stainless steel into which a weight piece of mass 5kg and a base of 1.5 x 6cm is closely fitted, with glass or acrylic resin plates of the same size and of 0.15cm thickness.

Fabrics specimen 10 x 4 cm was placed in between the two adjacent fabrics and sewn along one of the shorter sides to form a composite specimen. The test sample was wetted in alkaline solution at a liquor ratio of 50:1 and allowed to remain in the solution at room temperature for 30 minutes. To ensure good and uniform penetration of the liquor the sample was pressed and moved from time to time. The solution was poured and excess liquor was removed. The testing device containing specimen was kept in the oven for 4 hours at $37 \pm 2^\circ\text{C}$. The composite specimen was opened by breaking the stitching on all sides except one of the shorter sides. It was dried by hanging it in air at a temperature not exceeding 60°C. Second composite specimen was treated similarly using acidic solution instead of alkaline solution. Test was repeated for other composite specimens and the change in colour of the treated test specimens was evaluated.

2.4.2.3 (V) Colour Fastness to Light

The light fastness was assessed in accordance with AATCC 16: 2004 on Xenon –arc lamp Fade O meter. In this method test samples are exposed simultaneously with a set of standard dyed wool samples of graded light fastness to the light source until appreciable fading was attained in the test specimen. The faded sample was then compared with the exposed blue wool standards and assigned a numerical value as per grey scale on AATCC blue wool standard L4 after 20 AFU exposures.

2.4.2.3 (VI) Colour Fastness to Dry Cleaning

Fastness of the dye in the painted fabrics was tested by dry cleaning test. The standard adopted for the test was IS: 4802:1988 at 30°C for 30 minutes. Solvent used was Perchloro ethylene. A bag was prepared with inside dimensions of 10x10cm using the undyed cotton twill cloth by sewing together two squares of this cloth around three sides. Specimen and 12 steel discs were placed inside the bag and closed. This was placed in the container with 200 ml of the dry-cleaning solvent at $30 \pm 2^\circ\text{C}$. Specimen was treated for 30 minutes at $30 \pm 2^\circ\text{C}$ in the specified mechanical equipment. At the conclusion of the test, the discoloration of the solvent was assessed by comparing the filtered solvent with unused solvent. After words solvent remaining in the container was filtered through filter paper. Colour of the filtered solvent was compared with that of unused solvent. The samples were evaluated by means of grey scale.

2.4.2.3 (VII) Dimensional Stability

A test specimen measuring 70X70 cm was drawn from both the fabrics and conditioned to moisture equilibrium under standard conditions. The warp and weft yarns were marked in the specimen properly. The fabrics were soaked in the relevant washing solution. After the specified time, the samples were rinsed and excess water was removed by hand squeezing, drying was completed by means of flat drying. After drying the specimen was conditioned and the distance between the marked lines both in warp and weft directions were measured. The shrinkage on washing was calculated using the formula,

$$S = \frac{(a-b)}{a} \times 100$$

Where, S= percentage dimensional change, a= distance between marked lines before treatment and b=distance between the same marked lines after washing. The average of five specimens was calculated as per IS 2977-1964

2.4.2.3 (VIII) Determination of Pilling

Pilling is the fabrics surface fault characterized by little 'pills' of entangled fiber clinging to the cloth surface and giving the garment an unsightly appearance. The fabrics specimen was tested using Paramount Pilling Tester. The fabrics specimen is cut using the

template. The sample is placed round the rubber tube and subjected to 18000 revolutions. The samples were then assessed visually by comparison with the standard scale ranging from 1 (severe pilling) to 5 (no pilling) as per IS 10971

2.4.3. Assessment of Dye Color Receptivity in Terms of K/S

The dye receptivity was determined in a Mcbeth 2020+ reflectance spectrophotometer interfaced with a computer. The reflectance values R of the painted fabrics at wavelength of maximum absorption (520 nm) were converted to the corresponding K/S value using the following Kubelka –Munk equation:

$$K/S = (1-R)^2/2R$$

Where, R is the reflectance at complete opacity. K= absorption coefficient, S= Scattering Coefficient.

2.4.4. Subjective Assessment

The difference in the handle of the finished hand painted silk crepe and silk chiffon fabrics was evaluated subjectively in comparison with the controlled samples using a questionnaire tool. The questionnaire is shown in appendix I B. 50 textile professionals carried out the subjective assessment. The difference in the design, appearance, and attractiveness and painting technique was evaluated using ranking technique and shown in appendix IB

2.5. Phase V –Garment Acceptance and Brand Development

In phase V, the garment acceptance and brand development was carried out. To study the acceptance of the hand painting crepe silks and silk chiffons designed Kutrass and sarees with different techniques using eco-friendly dyes. An exhibition was held at Smt.V.H.D. Central Institute of Home Science, Bangalore. The products were displayed to 50 respondents from textiles background and 50 respondents from non textile background. The respondents were chosen randomly and a questionnaire was given to them. The respondents were asked to rate the garments on various criteria such as choice of fabrics used, colour, price, design, overall appearance on a scale of 1 to 5 where 1 denotes poor and 5 denotes excellent. The respondents from both categories were asked to rate the designed and developed hand painted Kutrass, sarees and accessories. The collections were displayed under the brand name “Eco-Moiré” and logo “EM” which stands for eco-friendly silks. The brand name and logo were designed keeping in mind the use of hand painting techniques using eco-friendly dyes for the development of the Hand painted Kutrass, sarees and accessories collection. The brand name and logo are displayed in plate 2.24 and 2.25. The questionnaire is shown in appendix IA.



2.6. Phase VI Statistical Application

The acceptance study data was collected compiled and analyzed using Pearson’s and Friedman’s Test which is shown in appendix V. The results were analyzed using T-test, correlation coefficient, the data was analyzed.

CHAPTER III

3. Results and Discussion

Chapter 3 discusses the results of the test conducted on the finished and unfinished fabrics as well as the study of the consumer acceptance of the designed and developed hand painted silk Kurti’s, Sarees and Accessories. The data collected was compiled and statistically analyzed. The results obtained for the study “Design and development of hand painted silk apparels using eco friendly dyes”, were explicated under the following sub-headings:

- Pilot study on availability of hand painted silk fabrics in the retail market through Interview schedule.
- Standardization of body measurements
- Comparison of basic geometric properties of unpainted and hand painted silk.
- Evaluation of Eco parameters of the selected dyes.
- Assessment on quality aspects of hand painted fabrics.

- Assessment of colour fastness properties.
- Spectrophotometric assessment of painted fabrics for colour measurement and colour coordinates.
- Subjective evaluation of hand painted fabrics and unpainted fabrics
- Statistical Analysis and acceptance of designed apparels and accessories by Textile and Non-Textile respondents.

3.1. Pilot Study on Availability of Hand Painted Silk Fabrics in the Retail Market

Hand Painted Kurti's and Sarees are not available over the counter in India. Kurtis and sarees are available in various forms of surface ornamentation like Woven, printed and dyes fabrics. Hand painted fabric is restricted only to wall hangings. There is a great need for change and innovation that will bring about a change with new designs and scope for self employment.

To study the availability and demand of Hand painted fabrics in the local market, a pilot study was conducted among 50 retailers and manufacturers of Kurtis and sarees. Brands and retailers included in the study were selected randomly from different areas of Bangalore city and comprised of brands such as Mother Earth, BIBA, Satya paul, Soch, Favourite Shop, Roop Sangam, Samyakk, Kalamandir, Sudarshan silks, Arpitadeepam, Hamadan Inn, Jashn, Vastra, Kalanjali, Mughal Arts, Harra KBC, Mom and Me, Kalanikethan, VEE Pee Collection, Show Case, Roopam silks International, Kalyan Silks, Kala Sangham, Fashion World, Wild West, Sparsh, Vinegar, Tommy Hilfiger, Label Ritu Kumar. The details furnished below were collected through an interview schedule:

- In terms of the design using different techniques, the manufacturer and retailers were of the opinion that fabrics made with various kinds of surface ornamentation like printed, woven, dyed and work sarees with embroidery or sequence work fabrics were readily available and which ruled the market. The manufacturer and retailers also felt that there was not much innovation in designs in the recent past, as there was no hand painted fabrics available over the counter. From this it can be concluded that the design creativity were restricted to woven, printed and dyed fabrics and there is a great scope for hand painted fabrics with contemporary designs which can be refreshing and more appealing to the consumer and will have good commercial viability when produced.
- Fabrics are an integral part of design and development of apparels. The manufacturers and retailers were of the opinion that silk, cotton, cotton silk, dupion silk, synthetic fabrics were used for Kurti and sarees. Many of the respondents felt that fabrics need to be given importance as the outlook of the design on certain fabrics brings out the beauty of the design. Hence, there is a great scope for innovative designs and hand painting techniques on silks to meet the demands of the consumer
- Colour combination, functionality and end use were of great importance given by the manufacturers and retailers to meet the demands of today's consumer. The overall outlook, texture, colour combination, comfort and feel of the fabric were some of the factors that the consumer looked for during the purchase of Kurti and sarees.
- In terms of surface design and colour, bright and pastel shades topped the preferential list. The manufacturers and retailers emphasized on floral prints and conventional designs keeping in mind present trends in the consumer preferences.
- To conclude the manufacturers and retailers indicated that there was a great demand for Kurtis and sarees with hand painting techniques on silk fabric. Any new innovation in designs and colour that were ecofriendly could be implemented to meet the demands of the present day consumers who lay great emphasize on ecofriendly products. They were also of the opinion that commercially viable products will be the demand of the future.

Hence the study showed that there is a remarkable scope for the development of eco friendly hand painted Kurtis and sarees with innovative designs in terms of structural and functional features in apparels. As the market does not offer any hand painted Kurtis, sarees of crepe silk and silk chiffons with different hand painting techniques which are ecofriendly, these will definitely have a great impact in the domestic and global market. The fabric used, colour and design of the hand painted fabrics play an important role in designing of Kurtis and sarees that are trendy and in great demand among consumers.

3.2. Standardization of Body Measurement

A comparative study of the compiled data was carried out with the standard measurement chart.

SL. NO	Body Measurement	Standard Measurement (inch)	Achieved Measurement (inch)	Range (inch)
1	Bust	38	37	37-38
2	Waist	32.5	31	31-33
3	Hip	41	41.5	41-42
4	Full length	36	36.5	36-37
5	shoulder	14	13	13-15
6	Waist length	16	16.5	16-17

7	Neck circumference	14	15	14-15
8	Back neck depth	4	4.5	4-5
9	Front neck depth	7	7.5	7-8
10	Shoulder to apex	11.5	11.5	11-12
11	Apex to apex	8	7.5	7.5-8
12	Back length	15.5	14.5	14.5-16
13	Back width	16	14.5	14.5-16
14	Arm hole circumference	17.5	18.5	17-19
15	Sleeve length	24.5	24.5	24-25
16	Sleeve length 3/4	18	18	18-19
17	Sleeve length (elbow)	14	14	14-15
18	Upper arm	14.5	14.5	14.5-15
19	Lower arm	12.5	13	13-14

*Table 3.1: Standardized Body Measurement Chart
National Bureau of Standards, U.S Department of Commerce*

The Table 3.1 showed that apart from bust and waist measurements which were less than standard, the rest of the measurements were almost same. Kurti is a loose fit garment and choli is clothing worn close to the body and thus measurements play an important role in the fit of the garment. For Kurti, the circumference measurement, bust, waist and hip measurement are of main focus and the chart showed that all the measurements were in the standard range for petite size. The bust and waist measurement showed a variation of 1” between the standard and achieved measurement.

Sl. No	Body measurement	Inches
1	Bust	38
2	Waist	32.5
3	Hip	41
4	Full length	36
5	shoulder	14
6	Waist length	16
7	Neck circumference	14
8	Back neck depth	4
9	Front neck depth	7
10	Shoulder to apex	11.5
11	Apex to apex	8
12	Back length	15.5
13	Back width	16
14	Arm hole circumference	17.5
15	Sleeve length	24.5
16	Sleeve length 3/4	18

17	Sleeve length (elbow)	14
18	Upper arm	14.5
19	Lower arm	12.5

Table 3.2: Required Measurements for Construction of Kurti

Table 3.2 gives the specific measurement chart size needed for construction of Kurti, taking into account the deviation from the ideal measurement, more generic for Indian women anatomy. For Kurti, bust, waist, hip, front length, arm scye, shoulder, and sleeve length is most necessary. The table showed that most of the measurements fall in the standard range of medium size.

Sl. No	Body measurement	Inches
1	Bust	36
2	Waist	28
3	shoulder	14
4	Waist length	14
5	Neck circumference	14.5
6	Back neck depth	3
7	Front neck depth	6
8	Shoulder to apex	9.5
9	Apex to apex	7
10	Back length	13.5
11	Back width	13.5
12	Arm hole circumference	17
13	Sleeve length	7
14	Upper arm	13.5
15	Lower arm	11.5

Table 3.3: Required Measurements for Construction of Choli

Table 3.3 gives the specific measurement chart size needed for construction of Choli, taking into account the deviation from the ideal measurement, more generic for Indian women anatomy. For choli, bust, waist, front length, arm scye, shoulder, shoulder to apex, apex to apex, and sleeve length is most necessary. The table showed that most of the measurements fall in the standard range of medium size. Hence the derived measurements were close to the standard measurements for Kurti size 12, which falls into the category of women size and the standard measurement for choli size 6, which falls into the category of petite size. These measurements were used to develop Kurti and choli.

3.3. Geometrical Properties of Unpainted and Painted Fabrics

The Greige Crepe silk and silk chiffon fabrics and the hand painted fabrics have their own inherent characteristics, but today's consumers have changed their outlook on how they dress. The Silk's attractive lustre and drape makes it suitable for many applications. Each delicate silk fiber is tougher than a comparable amount of steel, making silk both luxurious and incredibly strong. Using silk in any of its capacities ensures a high quality product and is practical for many uses. The geometrical and physical properties of the fabrics were explained in this part.

Geometric Properties	Greige-Unpainted		Painted	
	Chiffon	Crepe	Chiffon	Crepe
Ends per inch	104	168	105	170
Picks per inch	85	100	84	101
Fabric weight in gm/cm ²	40	60	38	58
Fabric Thickness (cms)	0.14	0.18	0.13	0.18

Table 3.4: Geometrical Properties of Unpainted and Painted Fabrics

Table 3.4 showed the geometrical properties of the Greige and the painted silk fabrics. It was clear that the weight of painted samples reduced after the painting as the fabric was subjected to washing process for the removal of residual gum and other impurities present in the Greige fabric. The thickness of the painted silk crepe fabric remained unchanged, where as the silk chiffon had reduced minimally. The overall geometrical properties of the painted samples had brought the closeness and consolidation of the fabric set.

3.4. Evaluation of Eco Parameters of the Selected Dyes

The painted samples were subjected to test for determination of banned substances at Textile Committee, Bangalore. The results showed that the dyes used in the hand painted samples did not contain any of banned amines as per German Regulation. The results of the following are enclosed in the report in appendix II. Hence, it was proven that the hands painted samples were ecofriendly in nature and was not harmful to the environment.

3.5. Assessment on Quality Aspects of Painted Fabrics

The painted chiffon and crepe fabrics were tested to study the effect of painting using various techniques on the performance of the fabrics. The effect of the painting on different properties of the fabrics based on the end use was analyzed. The results of the fastness to washing, rubbing both dry and wet, sunlight, perspiration, dimensional stability, pilling, stiffness and drapability of the painted fabrics were discussed.

3.5.1. Dimensional Stability

Fabrics	Lengthwise (%)	Widthwise (%)
Unpainted chiffon	-1	+2
Painted chiffon	-2	-2
Unpainted crepe	+2	+1
Painted crepe	+2.1	+1.5

Table 3.5 Dimensional Changes for Chiffon and Crepe Silk Fabrics Before and After Painting

Note: (+) sign means elongation and (-) sign means shrinkage.

Dimensional changes of the fabric specimen or a generic term for changes in length and width when subjected to specific conditions. The change was expressed as a percentage of the initial dimension of the specimen. Growth is the dimensional change resulting in an increase of length or width of a specimen. Shrinkage results in decrease in length or width of a specimen. The table 3.5 clearly showed that, the painted samples displayed considerable dimensional stability within the range of 1.5% to 2.1%, which is within the standard limit of $\pm 5\%$. In comparison the unpainted fabrics showed dimensional stability ranging from 1 to 2%. Hence both chiffon and crepe fabrics reported good improvement in dimensional stability after painting and better ability to withstand wear and tear which is essential for apparels.

3.5.2. Pilling

Fabrics (Crepe)	Degree of Pilling
Unpainted crepe	5
Gutta technique	5
Alcohol technique	5
Salt technique	5
Sugar technique	5
Water technique	5
Urea technique	5
Innovative Batik technique	5

Table 3.6 Degree of Pilling of Hand Painted Crepe Silk Fabrics

Fabrics (Chiffon)	Degree of Pilling
Unpainted crepe	5
Gutta technique	5
Alcohol technique	5
Salt technique	5
Sugar technique	5
Water technique	5
Urea technique	5
Innovative Batik technique	5

Table 3.7 Degree of Pilling of Hand Painted Silk Chiffon Fabrics

It was observed from the tables 3.6 and 3.7 that both the chiffon and crepe silk fabrics (unpainted and painted) samples showed the same pilling rating of 5 (5-no change). Therefore the painting treatment had not affected this property of the fabrics.

3.5.3. Drape Co-Efficient

Fabric (Crepe)	Drape Co-efficient Percentage (F %)
Greige	27.97
Gutta Technique	28.09
Alcohol Technique	27.82
Salt Technique	27.84
Sugar Technique	27.42
Water Technique	27.38
Urea Technique	27.20
Innovative Batik Technique	27.96

Table 3.8 Drape Co-Efficient Percentage of Crepe Silk Fabrics

Fabric (Chiffon)	Drape Co-efficient Percentage (F %)
Greige	27.58
Gutta Technique	27.96
Alcohol Technique	27.85
Salt Technique	27.89
Sugar Technique	28.02
Water Technique	27.56

Urea Technique	27.22
Innovative Batik Technique	27.55

Table 3.9 Drape Co-Efficient Percentage of Silk Chiffon Fabrics

Drape, along with color, luster, and texture is an important factor affecting the aesthetics and dynamic functionality of fabrics. A low Drape Co-efficient indicates easy deformation of a fabric and a high drape coefficient indicates less deformation. The table clearly showed that, the painted samples displayed considerable drapability within the range of ± 0.5 in comparison with the unpainted fabrics in case of both chiffon and crepe silk fabrics. Hence both chiffon and crepe fabrics reported good drapability after painting which is essential for apparels.

3.6. Assessment of Colour Fastness Properties

3.6.1. Colorfastness to Washing

Fabrics	Wash fastness	
	Chiffon	Crepe
Gutta Technique	4/5	5
Alcohol Technique	5	4
Salt Technique	3	5
Sugar Technique	4/5	4/5
Water Technique	4	4
Urea Technique	4/5	3/4
Innovative Batik Technique	5	5

Table 3.10: Colour Fastness to Washing

Note: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Very Poor

The table 3.10 depicts that both chiffon and crepe samples painted using different techniques showed good to excellent colour fastness properties, except the chiffon silk painted using salt technique which showed a fair colour fastness property and crepe silk painted using urea technique which showed a fair to good colour fastness property.

3.6.2. Color Fastness to Rubbing

Techniques	RUBBING FASTNESS			
	DRY		WET	
	Chiffon	Crepe	Chiffon	Crepe
Gutta Technique	5	5	5	5
Alcohol Technique	5	5	5	5
Salt Technique	4	4/5	4	4/5
Sugar Technique	5	5	5	4/5
Water Technique	5	5	5	5
Urea Technique	5	5	5	5
Innovative Batik Technique	5	4	5	4

Table 3.11: Colour Fastness To Rubbing (Dry And Wet)

Note: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Very Poor

The test is undertaken on a crock meter, whereby the fabric specimen is subjected to rubbing with a sample of standard undyed cotton fabric in order to check for colour transfer.

The table 3.11 depicts that both silk chiffon and silk crepe samples painted using different techniques showed good to excellent colour fastness properties to rubbing both in the dry and wet condition.

3.6.3. Color Fastness to Sunlight

Techniques	SUNLIGHT FASTNESS	
	Chiffon	Crepe
Gutta Technique	3/4	4
Alcohol Technique	3/4	4
Salt Technique	4/5	4
Sugar Technique	4/5	4/5
Water Technique	4/5	4/5
Urea Technique	4	4/5
Innovative Batik technique	3/4	4/5

Table 3.12: Colour Fastness to Sunlight

Note: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Very Poor

The table 3.12 depicts that silk chiffon samples hand painted using different techniques showed fair to excellent colour fastness properties to sunlight. Whereas the crepe samples painted using different techniques showed good to excellent colour fastness properties to Sunlight.

3.6.4. Ph Value and Colour Fastness to Perspiration

Fabrics (Crepe)	Change in colour		Staining	
	Acid	Alkaline	Acid	Alkaline
Gutta Technique	4/5	4/5	4/5	4/5
Alcohol Technique	4	4	4	4/5
Salt Technique	4/5	4	4/5	5
Sugar Technique	4/5	4/5	4	4/5
Water Technique	4/5	4/5	4/5	4
Urea Technique	4/5	4/5	4	4
Innovative Batik Technique	4/5	4/5	4/5	4

Table 3.13: Ph Value and Colour Fastness to Perspiration of Crepe Silk Fabric

Fabrics (Chiffon)	Change in colour		Staining	
	Acid	Alkaline	Acid	Alkaline
Gutta Technique	4/5	4/5	4/5	4
Alcohol Technique	4	4/5	4/5	4/5
Salt Technique	4	4	3/4	4
Sugar Technique	4/5	4/5	4/5	4
Water Technique	4/5	4/5	4	4
Urea Technique	4	4	3/4	3/4
Innovative Batik Technique	4/5	4/5	4	4

Table 3.14: Ph Value and Colour Fastness to Perspiration of Silk Chiffon Fabric

The tables 3.13 and 3.14 depicts that both silk chiffon and silk crepe samples painted using different techniques showed good to excellent colour fastness properties to perspiration both in the acidic and alkaline condition

3.7. Spectrophotometric Assessment of Painted Fabrics for Colour Measurement and Colour Coordinates

Colour of textiles material is an important parameter to be presented to the customer. Therefore, the colouration of textiles, its assessment and matching are important phases in production of textile materials. Painted samples were analysed by measuring the

reflectance curve between 400nm and 700 nm with spectrophotometer. The relationship between reflectance values and dye paint concentration of a fabric has complicated structure and this relationship is represented as K/S values. The reflectance (R) is measured as a function of wavelength and plotted against the related wavelengths in order to obtain a curve of the painted fabric. The K/S values were tested for Crepe Silk and silk chiffon fabric samples which were painted with dyes converted into paints. According to Textile Committee course material Vol II (2012) the spectrophotometer are more versatile, suitable for complex colour analysis such as metamerism and strength comparison. Therefore the best method for communicating colour is employing the use of a spectrophotometer.

One can determine color strength using following different methods:

Strength of any colorant (dyestuff / pigment) is related to absorption property. We measure reflectance and not absorbance. It is known to us that when reflectance is more, absorbance is less and when reflectance is less, absorbance is more. Kubelka – Munk theory gives us the following relation between reflectance and absorbance:

$$K/S = \{[(1-R)^2 / 2R]\}$$

Where R is the reflectance, K is absorbance and S is the scattering. K/S Vs Wavelength curve is always characteristics of every colorant.

Color Strength is defined as:

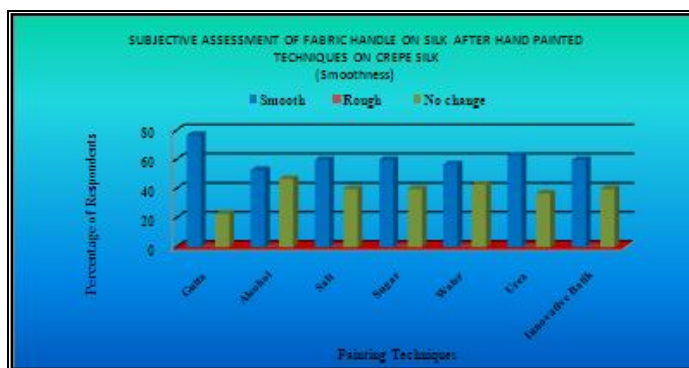
$$\text{Color Strength} = [(K/S)_{\text{Batch}} / (K/S)_{\text{Standard}}] \times 100$$

The standardized colours for the hand painting techniques are depicted in the table 4.1. The K/S values for the standardized colours ranged from 3 to 310 and the strength of the standardized colours chosen ranged from 114% to 380%. The hand painted finished fabrics were not subjected to the determination of k/s values due to the varied effects created by the green chemicals on the surface of the Hand painted samples.

3.8. Subjective Assessment

Painting Techniques	Smooth	Rough	No change
Gutta	77	0	23
Alcohol	53	0	47
Salt	60	0	40
Sugar	60	0	40
Water	57	0	43
Urea	63	0	37
Innovative Batik	60	0	40

Table 3.15 Subjective Assessments for Smoothness of Crepe Silk

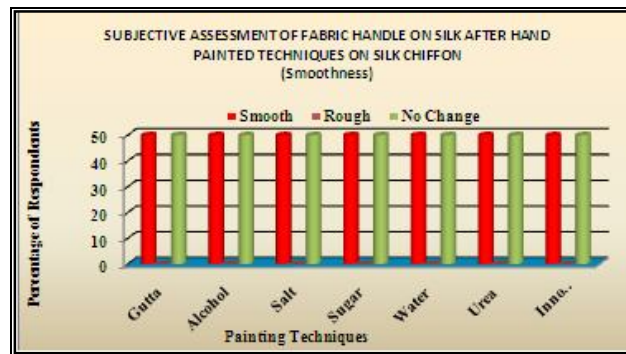


Graph 3.1 Subjective Assessments for Smoothness of Crepe Silk

From the above graph 3.1 and table 3.15 it is clear that painting processes on crepe fabrics has improved and increased the smoothness. It consequently also made the fabrics smooth and led to a compressible feel in the fabric.

Painting Techniques	Smooth	Rough	No Change
Gutta	50	0	50
Alcohol	50	0	50
Salt	50	0	50
Sugar	50	0	50
Water	50	0	50
Urea	50	0	50
Innovative Batik	50	0	50

Table 3.16 Subjective Assessments for Smoothness of Silk Chiffon

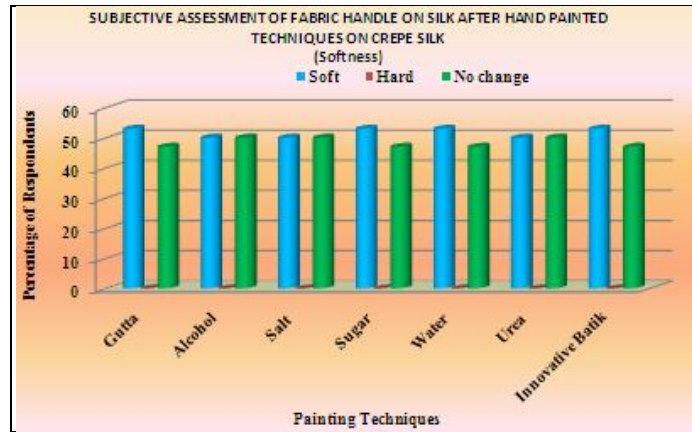


Graph 3.2 Subjective Assessments for Smoothness of Silk Chiffon

From the above graph 3.2 and table 3.16 it is clear that painting processes on chiffon fabrics has improved and increased the smoothness, cover factor of the fabrics. It consequently also made the fabrics smooth and led to a compressible feel in the fabric.

Painting Techniques	Soft	Hard	No change
Gutta	53	0	47
Alcohol	50	0	50
Salt	50	0	50
Sugar	53	0	47
Water	53	0	47
Urea	50	0	50
Innovative Batik	53	0	47

Table 3.17 Subjective Assessments for Softness of Crepe Silk

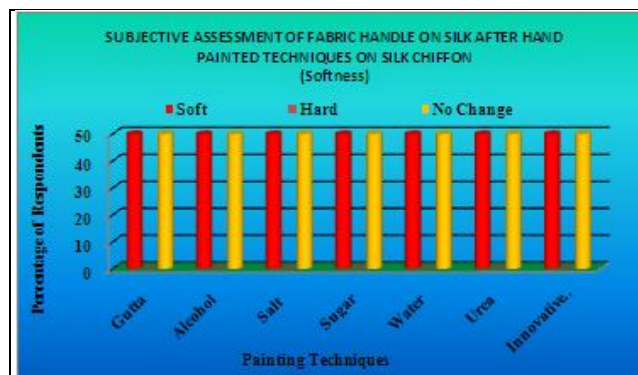


Graph 3.3 Subjective Assessments for Softness of Crepe Silk

From the above graph 3.3 and table 3.17 it is clear that painting processes on crepe fabrics has improved and increased the softness, cover factor of the fabrics. It consequently also made the fabrics soft and led to a lustrous feel to the fabric.

Painting Techniques	Soft	Hard	No Change
Gutta	50	0	50
Alcohol	50	0	50
Salt	50	0	50
Sugar	50	0	50
Water	50	0	50
Urea	50	0	50
Innovative Batik	50	0	50

Table 3.18 Subjective Assessments for Softness of Silk Chiffon

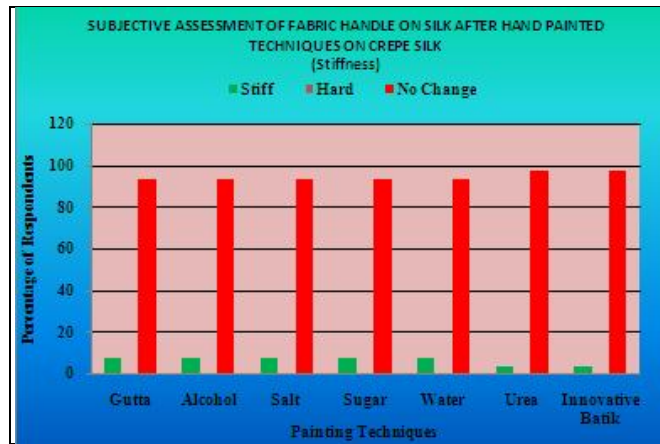


Graph 3.4 Subjective Assessments for Softness Silk Chiffon

From the above graph 3.4 and table 3.18 it is clear that from half of the respondents painting processes on chiffon fabrics has improved and increased the softness, cover factor of the fabrics. It consequently also made the fabrics soft and led to a lustrous feel to the fabric.

Painting Techniques	Stiff	Hard	No Change
Gutta	7	0	93
Alcohol	7	0	93
Salt	7	0	93
Sugar	7	0	93
Water	7	0	93
Urea	3	0	97
Innovative Batik	3	0	97

Table 3.19 Subjective Assessments for Stiffness of Crepe Silk

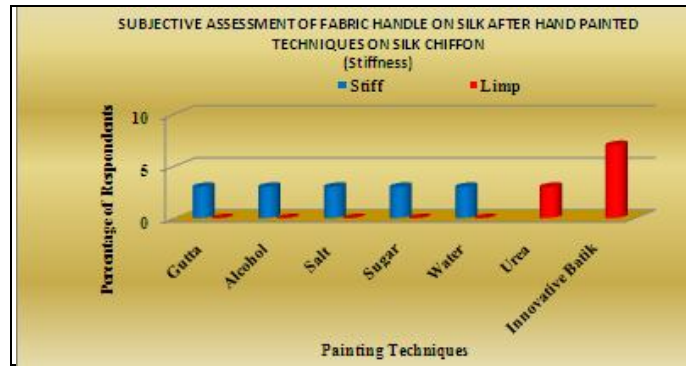


Graph 3.5 Subjective Assessments for Stiffness of Crepe Silk

From the above graph 3.5 and table 3.19 it is clear that painting processes on crepe fabrics has no change on the stiffness of the fabric. The painting process hasn't increased the stiffness level on the fabric and the fabrics haven't increased in terms of bending properties.

Painting Techniques	Stiff	Limp	No change
Gutta	3	0	97
Alcohol	3	0	97
Salt	3	0	97
Sugar	3	0	97
Water	3	0	97
Urea	0	3	97
Innovative Batik	0	7	93

Table 3.20 Subjective Assessments for Stiffness of Silk Chiffon



Graph 3.6 Subjective Assessments for Stiffness of Silk Chiffon

From the above graph 3.6 and table 3.20 it is clear that painting processes on chiffon fabrics has no change on the stiffness of the fabric. The painting process hasn't increased the stiffness level on the fabric and the fabrics haven't increased in terms of bending properties.

3.9. Statistical Analysis and Acceptance Of Designed and Accessories by Textiles and Non-Textiles Clients

3.9.1 Independent T-Test: Design

3.9.1.1. Independent T-Test: Design-Kurti

Objective: To know significant differences in the perception of design dimension of various hand painting techniques used on silks for kurtis across the type of fabric (textiles/non textiles)

H₀: The perception of design dimension of various hand painting techniques used on silks for kurti is same across the type of fabric (textiles/non textiles)

H_A: The perception of design dimension of various hand painting techniques used on silks for kurti differs across the type of fabric (textiles/non textiles)

Type: Kurtha Dimension - Design	Type	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Gutta	Textiles	50	4.60	0.64	0.09	6.69	0.00
	Non Textiles	50	3.42	1.07	0.15		
Alcohol	Textiles	50	4.54	0.71	0.10	5.11	0.00
	Non Textiles	50	3.68	0.96	0.14		
Salt	Textiles	50	4.50	0.65	0.09	4.15	0.00
	Non Textiles	50	3.74	1.12	0.16		
Sugar	Textiles	50	4.52	0.65	0.09	4.05	0.00
	Non Textiles	50	3.98	0.68	0.10		
Water	Textiles	50	4.66	0.63	0.09	5.04	0.00
	Non Textiles	50	3.92	0.83	0.12		

Table 3.21: Kurti

The above table brings out that the t-value and significance value. Since the significance value is less than 0.05, the mean difference in the perception of design dimension of this hand painting technique across the type of fabric is significant at 5% level for all techniques. Hence, null hypothesis is rejected and alternate hypothesis is accepted for all the techniques.

3.9.1.2. Independent T-Test: Design -Sarees

Objective: To know significant differences in the perception of design dimension of various hand painting techniques used on silks for sarees across the type of fabric (textiles/non textiles)

H₀: The perception of design dimension of various hand painting techniques used on silks for sarees is same across the type of fabric (textiles/non textiles)

H_A: The perception of design dimension of various hand painting techniques used on silks for sarees differs across the type of fabric (textiles/non textiles)

Type: Saree Dimension - Design	Type	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Gutta	Textiles	50	4.54	0.65	0.09	4.73	0.00
	Non Textiles	50	3.88	0.75	0.11		
Alcohol	Textiles	50	4.70	0.51	0.07	6.89	0.00
	Non Textiles	50	3.64	0.96	0.14		
Salt	Textiles	50	4.58	0.54	0.08	6.40	0.00
	Non Textiles	50	3.72	0.78	0.11		
Sugar	Textiles	50	4.58	0.70	0.10	4.20	0.00
	Non Textiles	50	3.94	0.82	0.12		
Water	Textiles	50	4.62	0.57	0.08	3.63	0.00
	Non Textiles	50	4.10	0.84	0.12		
Urea	Textiles	50	4.72	0.61	0.09	2.73	0.01
	Non Textiles	50	4.34	0.77	0.11		
Batik	Textiles	50	4.50	0.74	0.10	3.13	0.00
	Non Textiles	50	3.86	1.25	0.18		

Table 3.22: Saree

The above table brings out that the t-value and significance Value. Since the significance value is less than 0.05, the mean difference in the perception of design dimension of this hand painting technique across the type of fabric is significant at 5% level for all techniques. Hence, null hypothesis is rejected and alternate hypothesis is accepted for all techniques.

3.9.1.3. Independent T-Test: Design Accessories

Objective: To know significant differences in the perception of design dimension of various hand painting techniques used on silks for accessories across the type of fabric (textiles/non textiles)

H₀: The perception of design dimension of various hand painting techniques used on silks for accessories is same across the type of fabric (textiles/non textiles)

H_A: The perception of design dimension of various hand painting techniques used on silks for accessories differs across the type of fabric (textiles/non textiles)

Type: Accessories Dimension -Design	Type	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Gutta	Textiles	50	4.52	0.65	0.09	4.17	0.00
	Non Textiles	50	3.94	0.74	0.10		
Alcohol	Textiles	50	4.48	0.68	0.10	4.42	0.00
	Non Textiles	50	3.72	1.01	0.14		
Salt	Textiles	50	4.68	0.51	0.07	4.64	0.00
	Non Textiles	50	3.98	0.94	0.13		
Sugar	Textiles	50	4.54	0.68	0.10	5.13	0.00
	Non Textiles	50	3.72	0.90	0.13		
Water	Textiles	50	4.48	0.58	0.08	2.90	0.00
	Non Textiles	50	4.04	0.90	0.13		

Urea	Textiles	50	4.48	0.65	0.09	3.51	0.00
	Non Textiles	50	3.90	0.97	0.14		
Batik	Textiles	50	4.52	0.61	0.09	3.12	0.00
	Non Textiles	50	4.06	0.84	0.12		

Table 3.23: Accessories

The above table brings out that the t-value and significance Value. Since the significance value is less than 0.05, the mean difference in the perception of design dimension of this hand painting technique across the type of fabric is significant at 5% level for all the techniques. Hence, null hypothesis is rejected and alternate hypothesis is accepted for all the techniques.

3.9.2. Independent T-Test: Colour

3.9.2.1. Independent T-Test: Colour –Kurtis

Objective: To know significant differences in the perception of colour dimension of various hand painting techniques used on silks for kurtis across the type of fabric (textiles/non textiles)

H₀: The perception of color dimension of various hand painting techniques used on silks for kurtis is same across the type of fabric (textiles/non textiles)

H_A: The perception of colour dimension of various hand painting techniques used on silks for kurtis differs across the type of fabric (textiles/non textiles)

Type: Kurti Dimension – Color	Type	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Gutta	Textiles	50	4.54	0.68	0.10	5.57	0.00
	Non Textiles	50	3.34	1.36	0.19		
Alcohol	Textiles	50	4.48	0.68	0.10	7.79	0.00
	Non Textiles	50	3.10	1.05	0.15		
Salt	Textiles	50	4.40	0.76	0.11	5.30	0.00
	Non Textiles	50	3.44	1.03	0.15		
Sugar	Textiles	50	4.66	0.56	0.08	9.54	0.00
	Non Textiles	50	3.28	0.86	0.12		
Water	Textiles	50	4.50	0.74	0.10	3.04	0.00
	Non Textiles	50	3.94	1.08	0.15		
Urea	Textiles	50	4.56	0.61	0.09	3.35	0.00
	Non Textiles	50	4.00	1.01	0.14		
Batik	Textiles	50	4.52	0.61	0.09	6.96	0.00
	Non Textiles	50	3.46	0.89	0.13		

Table 3.24: Kurti

The above table brings out that the t-value and significance Value. Since the significance value is less than 0.05, the mean difference in the perception of colour dimension of this hand painting technique across the type of fabric is significant at 5% level for all techniques. Hence, null hypothesis is rejected and alternate hypothesis is accepted for all techniques.

3.9.2.2. Independent T-Test: Colour -Sarees

Objective: To know significant differences in the perception of colour dimension of various hand painting techniques used on silks for sarees across the type of fabric (textiles/non textiles)

H₀: The perception of color dimension of various hand painting techniques used on silks for sarees is same across the type of fabric (textiles/non textiles)

H_A: The perception of colour dimension of various hand painting techniques used on silks for sarees differs across the type of fabric (textiles/non textiles)

Type: Saree Dimension - Color	Type	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Gutta	Textiles	50	4.46	0.71	0.10	4.40	0.00
	Non Textiles	50	3.82	0.75	0.11		
Alcohol	Textiles	50	4.48	0.74	0.10	6.93	0.00
	Non Textiles	50	3.36	0.88	0.12		
Salt	Textiles	50	4.40	0.70	0.10	4.34	0.00
	Non Textiles	50	3.66	0.98	0.14		
Sugar	Textiles	50	4.54	0.76	0.11	4.70	0.00
	Non Textiles	50	3.72	0.97	0.14		
Water	Textiles	50	4.42	0.81	0.11	3.59	0.00
	Non Textiles	50	3.74	1.07	0.15		
Urea	Textiles	50	4.32	0.74	0.10	2.32	0.02
	Non Textiles	50	3.88	1.12	0.16		
Batik	Textiles	50	4.56	0.64	0.09	3.55	0.00
	Non Textiles	50	3.90	1.15	0.16		

Table 3.25: Saree

The above table brings out that the t-value and significance is 0.00. Since the significance value is less than 0.05, the mean difference in the perception of colour dimension of this hand painting technique across the type of fabric is significant at 5% level for all techniques. Hence, null hypothesis is rejected and alternate hypothesis is accepted for all techniques.

3.9.2.3. Independent T-Test: Colour - Accessories

Objective: To know significant differences in the perception of colour dimension of various hand painting techniques used on silks for sarees across the type of fabric (textiles/non textiles)

H₀: The perception of color dimension of various hand painting techniques used on silks for sarees is same across the type of fabric (textiles/non textiles)

H_A: The perception of colour dimension of various hand painting techniques used on silks for sarees differs across the type of fabric (textiles/non textiles)

Type: Accessories Dimension - Color	Type	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Gutta	Textiles	50	4.62	0.64	0.09	5.03	0.00
	Non Textiles	50	3.90	0.79	0.11		
Alcohol	Textiles	50	4.54	0.68	0.10	5.83	0.00
	Non Textiles	50	3.72	0.73	0.10		
Salt	Textiles	50	4.56	0.79	0.11	3.56	0.00
	Non Textiles	50	4.04	0.67	0.09		
Sugar	Textiles	50	4.50	0.74	0.10	5.42	0.00
	Non Textiles	50	3.74	0.66	0.09		
Water	Textiles	50	4.56	0.76	0.11	3.17	0.00
	Non Textiles	50	4.06	0.82	0.12		
Urea	Textiles	50	4.48	0.81	0.12	3.01	0.00
	Non Textiles	50	4.00	0.78	0.11		
Batik	Textiles	50	4.58	0.81	0.11	2.40	0.02

	Non Textiles	50	4.16	0.93	0.13		
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Table 3.26: Accessories

The above table brings out that the t-value and significance is 0.00. Since the significance value is less than 0.05, the mean difference in the perception of colour dimension of this hand painting technique across the type of fabric is significant at 5% level for all techniques. Hence, null hypothesis is rejected and alternate hypothesis is accepted for all techniques.

3.9.3. Paired Sample T-Test

3.9.3.1. Paired Sample T-Test - Gutta Kurti

Objective: To know significant differences in the perception of gutta hand painting technique for kurtis across the type of silk (crepe/chiffon)

H₀: The perception of gutta hand painting technique for kurtis is same across the type of silk (crepe/chiffon)

H_A: The perception of gutta hand painting technique for kurtis differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Kurtha Technique: Gutta	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 - Design	Crepe	100	3.77	0.98	0.10	-1.50	0.14
	Chiffon	100	3.91	1.12	0.11		
Pair 2 - Colour	Crepe	100	3.34	1.05	0.10	-1.17	0.24
	Chiffon	100	3.47	1.39	0.14		
Pair 3 - Workmanship	Crepe	100	3.70	0.89	0.09	-0.09	0.93
	Chiffon	100	3.71	1.13	0.11		
Pair 4 - Handle	Crepe	100	3.70	0.97	0.10	2.15	0.03
	Chiffon	100	3.53	0.95	0.09		
Pair 5 - Overall Appearance	Crepe	100	3.70	0.86	0.09	-0.35	0.73
	Chiffon	100	3.74	1.15	0.12		

Table 3.27: Kurti – Gutta

The above table brings out the t-value and significance for handle is 0.03. Since the significance value is less than 0.05, the mean difference in the perception of gutta hand painting technique for kurtis across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of gutta hand painting technique for kurtis across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.2. Paired Sample T-Test - Gutta Saree

Objective: To know significant differences in the perception of gutta hand painting technique for sarees across the type of silk (crepe/chiffon)

H₀: The perception of gutta hand painting technique for sarees is same across the type of silk (crepe/chiffon)

H_A: The perception of gutta hand painting technique for sarees differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Saree Technique: Gutta	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 - Design	Crepe	100	3.99	0.96	0.10	-3.00	0.00
	Chiffon	100	4.21	0.88	0.09		
Pair 2 - Colour	Crepe	100	3.81	1.13	0.11	-0.40	0.69
	Chiffon	100	3.85	1.00	0.10		
Pair 3 - Workmanship	Crepe	100	3.70	1.10	0.11	-2.50	0.01
	Chiffon	100	3.98	0.99	0.10		

Pair 4 - Handle	Crepe	100	3.92	1.08	0.11	0.60	0.55
	Chiffon	100	3.87	0.86	0.09		
Pair 5 - Overall Appearance	Crepe	100	3.75	1.00	0.10	-2.10	0.04
	Chiffon	100	3.94	1.03	0.10		

Table 3.28: Saree – Gutta

The above table brings out the t-value and significance for Design, workmanship and overall appearance is 0.00, 0.01 and 0.04 respectively. Since the significance value is less than 0.05, the mean difference in the perception of gutta hand painting technique for sarees across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of gutta hand painting technique for Sarees across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.3. Paired Sample T-Test - Gutta Accessories

Objective: To know significant differences in the perception of gutta hand painting technique for accessories across the type of silk (crepe/chiffon)

H₀: The perception of gutta hand painting technique for accessories is same across the type of silk (crepe/chiffon)

H_A: The perception of gutta hand painting technique for accessories differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Accessories Technique: Gutta	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.26	0.75	0.07	-3.53	0.00
	Chiffon	100	4.54	0.64	0.06		
Pair 2 – Colour	Crepe	100	4.07	0.87	0.09	-2.17	0.03
	Chiffon	100	4.28	0.57	0.06		
Pair 3 - Workmanship	Crepe	100	4.31	0.87	0.09	0.00	1.00
	Chiffon	100	4.31	0.91	0.09		
Pair 4 – Handle	Crepe	100	4.21	0.77	0.08	0.11	0.91
	Chiffon	100	4.20	0.78	0.08		
Pair 5 - Overall Appearance	Crepe	100	4.26	0.76	0.08	-1.26	0.21
	Chiffon	100	4.39	0.72	0.07		

Table 3.29: Accessories – Gutta

The above table brings out the t-value and significance for Design and Colour is 0.00 and 0.03 respectively. Since the significance value is less than 0.05, the mean difference in the perception of gutta hand painting technique for Accessories across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of gutta hand painting technique for Accessories across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.4. Paired Sample T-Test - Alcohol Technique - Kurti

Objective: To know significant differences in the perception of alcohol hand painting technique for kurtis across the type of silk (crepe/chiffon)

H₀: The perception of alcohol hand painting technique for kurtis is same across the type of silk (crepe/chiffon)

H_A: The perception of alcohol hand painting technique for kurtis differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Kurtha Technique: Alcohol	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	3.77	1.19	0.12	-4.34	0.00
	Chiffon	100	4.25	0.85	0.08		
Pair 2 – Colour	Crepe	100	3.74	1.21	0.12	-3.66	0.00

	Chiffon	100	4.09	0.83	0.08		
Pair 3 - Workmanship	Crepe	100	3.47	1.20	0.12	-5.01	0.00
	Chiffon	100	4.12	1.07	0.11		
Pair 4 – Handle	Crepe	100	3.85	0.97	0.10	-2.04	0.04
	Chiffon	100	4.06	0.94	0.09		
Pair 5 - Overall Appearance	Crepe	100	3.54	1.14	0.11	-6.46	0.00
	Chiffon	100	4.22	0.92	0.09		

Table 3.30: Kurti – Alcohol

The above table brings out that the t-value and significance level. Since the significance value is less than 0.05, the mean difference in the perception of alcohol hand painting technique for kurtis across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted.

3.9.3.5. Paired Sample T-Test - Alcohol Technique - Saree

Objective: To know significant differences in the perception of alcohol hand painting technique for sarees across the type of silk (crepe/chiffon)

H₀: The perception of alcohol hand painting technique for sarees is same across the type of silk (crepe/chiffon)

H_A: The perception of alcohol hand painting technique for sarees differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Saree Technique: Alcohol	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.13	0.95	0.09	-1.32	0.19
	Chiffon	100	4.28	0.74	0.07		
Pair 2 – Colour	Crepe	100	4.05	0.90	0.09	-0.22	0.83
	Chiffon	100	4.08	0.98	0.10		
Pair 3 - Workmanship	Crepe	100	3.82	0.95	0.09	-1.49	0.14
	Chiffon	100	3.99	1.03	0.10		
Pair 4 – Handle	Crepe	100	3.94	0.84	0.08	-0.93	0.35
	Chiffon	100	4.05	1.00	0.10		
Pair 5 - Overall Appearance	Crepe	100	3.81	0.97	0.10	-2.11	0.04
	Chiffon	100	4.08	1.04	0.10		

Table 3.31: Saree – Alcohol

The above table brings out the t-value and significance for overall appearance 0.04. Since the significance value is less than 0.05, the mean difference in the perception of Alcohol hand painting technique for sarees across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Alcohol hand painting technique for Sarees across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.6. Paired Sample T-Test - Alcohol Technique – Accessories

Objective: To know significant differences in the perception of alcohol hand painting technique for accessories across the type of silk (crepe/chiffon)

H₀: The perception of alcohol hand painting technique for accessories is same across the type of silk (crepe/chiffon)

H_A: The perception of alcohol hand painting technique for accessories differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Accessories Technique: Alcohol	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.30	0.86	0.09	-1.93	0.06

	Chiffon	100	4.44	0.73	0.07		
Pair 2 – Colour	Crepe	100	4.10	0.92	0.09	-2.17	0.03
	Chiffon	100	4.30	0.75	0.07		
Pair 3 - Workmanship	Crepe	100	4.09	0.88	0.09	-2.77	0.01
	Chiffon	100	4.33	0.70	0.07		
Pair 4 – Handle	Crepe	100	4.28	0.81	0.08	0.91	0.36
	Chiffon	100	4.21	0.73	0.07		
Pair 5 - Overall Appearance	Crepe	100	4.17	0.91	0.09	-1.20	0.23
	Chiffon	100	4.27	0.79	0.08		

Table 3.32: Accessories – Alcohol

The above table brings out the t-value and significance for Colour and workmanship is 0.03 and 0.01 respectively. Since the significance value is less than 0.05, the mean difference in the perception of Alcohol hand painting technique for Accessories across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Alcohol hand painting technique for Accessories across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.7. Paired Sample T-Test - Salt Technique - Kurti

Objective: To know significant differences in the perception of salt hand painting technique for kurtis across the type of silk (crepe/chiffon)

H₀: The perception of salt hand painting technique for kurtis is same across the type of silk (crepe/chiffon)

H_A: The perception of salt hand painting technique for kurtis differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Kurtha Technique: Salt	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.22	0.87	0.09	-0.09	0.93
	Chiffon	100	4.23	0.81	0.08		
Pair 2 – Colour	Crepe	100	4.38	0.90	0.09	1.70	0.09
	Chiffon	100	4.22	0.79	0.08		
Pair 3 - Workmanship	Crepe	100	4.06	0.85	0.09	0.19	0.85
	Chiffon	100	4.04	1.01	0.10		
Pair 4 – Handle	Crepe	100	4.13	0.77	0.08	2.63	0.01
	Chiffon	100	3.90	1.07	0.11		
Pair 5 - Overall Appearance	Crepe	100	4.33	0.73	0.07	2.92	0.00
	Chiffon	100	4.08	0.97	0.10		

Table 3.33: Kurti – Salt

The above table brings out the t-value and significance for handle and overall appearance is 0.01 and 0.00 respectively. Since the significance value is less than 0.05, the mean difference in the perception of salt hand painting technique for kurtis across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of salt hand painting technique for kurtis across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.8. Paired Sample T-Test - Salt Technique – Saree

Objective: To know significant differences in the perception of salt hand painting technique for sarees across the type of silk (crepe/chiffon)

H₀: The perception of salt hand painting technique for sarees is same across the type of silk (crepe/chiffon)

H_A: The perception of salt hand painting technique for sarees differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Saree Technique: Salt	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.45	0.67	0.07	0.90	0.37
	Chiffon	100	4.39	0.75	0.08		
Pair 2 – Colour	Crepe	100	4.03	0.94	0.09	-3.23	0.00
	Chiffon	100	4.34	0.86	0.09		
Pair 3 - Workmanship	Crepe	100	4.08	0.79	0.08	0.11	0.91
	Chiffon	100	4.07	0.79	0.08		
Pair 4 – Handle	Crepe	100	4.17	0.85	0.09	1.65	0.10
	Chiffon	100	4.01	0.88	0.09		
Pair 5 - Overall Appearance	Crepe	100	3.88	1.04	0.10	-1.55	0.12
	Chiffon	100	4.03	0.99	0.10		

Table 3.34: Saree – Salt

The above table brings out the t-value and significance for colour is 0.00. Since the significance value is less than 0.05, the mean difference in the perception of Salt hand painting technique for sarees across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Salt hand painting technique for Sarees across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.9. Paired Sample T-Test - Salt Technique - Accessories

Objective: To know significant differences in the perception of salt hand painting technique for accessories across the type of silk (crepe/chiffon)

H₀: The perception of salt hand painting technique for accessories is same across the type of silk (crepe/chiffon)

H_A: The perception of salt hand painting technique for accessories differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Accessories Technique: Salt	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.35	0.88	0.09	-2.23	0.03
	Chiffon	100	4.47	0.73	0.07		
Pair 2 – Colour	Crepe	100	4.20	0.86	0.09	-2.24	0.03
	Chiffon	100	4.39	0.72	0.07		
Pair 3 - Workmanship	Crepe	100	4.30	0.95	0.09	-0.44	0.66
	Chiffon	100	4.34	0.74	0.07		
Pair 4 – Handle	Crepe	100	4.32	0.84	0.08	1.07	0.29
	Chiffon	100	4.24	0.83	0.08		
Pair 5 - Overall Appearance	Crepe	100	4.41	0.92	0.09	-1.45	0.15
	Chiffon	100	4.51	0.76	0.08		

Table 3.35: Accessories – Salt

The above table brings out the t-value and significance for Design and Colour is 0.03. Since the significance value is less than 0.05, the mean difference in the perception of Salt hand painting technique for Accessories across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Salt hand painting technique for Accessories across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.10. Paired Sample T-Test - Sugar Technique - Kurti

Objective: To know significant differences in the perception of sugar hand painting technique for kurtis across the type of silk (crepe/chiffon)

H₀: The perception of sugar hand painting technique for kurtis is same across the type of silk (crepe/chiffon)

H_A: The perception of sugar hand painting technique for kurtis differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Kurtha Technique: Sugar	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	3.72	1.03	0.10	-0.31	0.76
	Chiffon	100	3.75	1.23	0.12		
Pair 2 – Colour	Crepe	100	3.91	1.22	0.12	3.82	0.00
	Chiffon	100	3.42	1.42	0.14		
Pair 3 - Workmanship	Crepe	100	3.93	1.05	0.10	4.05	0.00
	Chiffon	100	3.54	1.33	0.13		
Pair 4 – Handle	Crepe	100	4.05	1.00	0.10	3.60	0.00
	Chiffon	100	3.69	1.21	0.12		
Pair 5 - Overall Appearance	Crepe	100	4.01	0.96	0.10	3.90	0.00
	Chiffon	100	3.64	1.28	0.13		

Table 3.36: Kurti – Sugar

The above table brings out the t-value and significance for Colour, workmanship, handle and overall appearance is 0.00. Since the significance value is less than 0.05, the mean difference in the perception of Sugar hand painting technique for kurtis across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Sugar hand painting technique for kurtis across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.11. Paired Sample T-Test - Sugar Technique – Saree

Objective: To know significant differences in the perception of sugar hand painting technique for sarees across the type of silk (crepe/chiffon)

H₀: The perception of sugar hand painting technique for sarees is same across the type of silk (crepe/chiffon)

H_A: The perception of sugar hand painting technique for sarees differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Saree Technique: Sugar	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 - Design	Crepe	99	4.09	1.07	0.11	-1.87	0.06
	Chiffon	99	4.30	0.83	0.08		
Pair 2 - Colour	Crepe	100	3.87	1.08	0.11	-2.07	0.04
	Chiffon	100	4.12	1.01	0.10		
Pair 3 - Workmanship	Crepe	100	3.89	1.09	0.11	-1.86	0.07
	Chiffon	100	4.12	0.89	0.09		
Pair 4 - Handle	Crepe	100	3.89	1.02	0.10	-2.17	0.03
	Chiffon	100	4.12	0.94	0.09		
Pair 5 - Overall Appearance	Crepe	100	3.91	1.06	0.11	-2.68	0.01
	Chiffon	100	4.24	0.94	0.09		

Table 3.37: Saree – Sugar

The above table brings out the t-value and significance for colour, handle and overall appearance is 0.04, 0.03, and 0.01 respectively. Since the significance value is less than 0.05, the mean difference in the perception of Sugar hand painting technique for sarees across

the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Sugar hand painting technique for Sarees across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted

3.9.3.12. Paired Sample T-Test - Sugar Technique – Accessories

Objective: To know significant differences in the perception of sugar hand painting technique for accessories across the type of silk (crepe/chiffon)

H₀: The perception of sugar hand painting technique for accessories is same across the type of silk (crepe/chiffon)

H_A: The perception of sugar hand painting technique for accessories differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Accessories Technique: Sugar	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.43	0.70	0.07	-4.24	0.00
	Chiffon	100	4.69	0.49	0.05		
Pair 2 – Colour	Crepe	100	4.48	0.75	0.07	-0.37	0.71
	Chiffon	100	4.51	0.63	0.06		
Pair 3 - Workmanship	Crepe	100	4.33	0.73	0.07	-2.07	0.04
	Chiffon	100	4.51	0.63	0.06		
Pair 4 – Handle	Crepe	100	4.42	0.68	0.07	0.28	0.78
	Chiffon	100	4.40	0.53	0.05		
Pair 5 - Overall Appearance	Crepe	100	4.38	0.78	0.08	-2.13	0.04

Table 3.38: Accessories – Sugar

The above table brings out the t-value and significance for Design, workmanship and overall appearance is 0.00, 0.04 and 0.04 respectively. Since the significance value is less than 0.05, the mean difference in the perception of sugar hand painting technique for Accessories across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Sugar hand painting technique for Accessories across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.13. Paired Sample T-Test - Water Technique – Kurti

Objective: To know significant differences in the perception of water hand painting technique for kurtis across the type of silk (crepe/chiffon)

H₀: The perception of water hand painting technique for kurtis is same across the type of silk (crepe/chiffon)

H_A: The perception of water hand painting technique for kurtis differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Kurtha Technique: Water	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.07	0.93	0.09	0.43	0.67
	Chiffon	100	4.03	0.89	0.09		
Pair 2 – Colour	Crepe	100	3.64	1.34	0.13	0.08	0.93
	Chiffon	100	3.63	1.04	0.10		
Pair 3 – Workmanship	Crepe	100	3.86	1.19	0.12	2.91	0.00
	Chiffon	100	3.50	1.24	0.12		
Pair 4 – Handle	Crepe	100	3.72	1.19	0.12	0.34	0.73
	Chiffon	100	3.69	1.13	0.11		
Pair 5 - Overall Appearance	Crepe	100	3.82	1.10	0.11	2.22	0.03
	Chiffon	100	3.56	1.18	0.12		

Table 3.39: Kurti – Water

The above table brings out the t-value and significance for workmanship and overall appearance is 0.00 and 0.03 respectively. Since the significance value is less than 0.05, the mean difference in the perception of water hand painting technique for kurtis across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of water hand painting technique for kurtis across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.14. Paired Sample T-Test - Water Technique – Saree

Objective: To know significant differences in the perception of water hand painting technique for sarees across the type of silk (crepe/chiffon)

H₀: The perception of water hand painting technique for sarees is same across the type of silk (crepe/chiffon)

H_A: The perception of water hand painting technique for sarees differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Saree Technique: Water	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.25	0.90	0.09	-0.48	0.63
	Chiffon	100	4.29	0.74	0.07		
Pair 2 – Colour	Crepe	100	4.15	0.94	0.09	0.60	0.55
	Chiffon	100	4.08	0.93	0.09		
Pair 3 - Workmanship	Crepe	100	4.22	0.87	0.09	2.13	0.04
	Chiffon	100	4.00	0.80	0.08		
Pair 4 – Handle	Crepe	100	4.14	0.93	0.09	1.42	0.16
	Chiffon	100	4.03	0.80	0.08		
Pair 5 - Overall Appearance	Crepe	100	4.28	0.93	0.09	0.80	0.43
	Chiffon	100	4.20	0.78	0.08		

Table 3.40: Saree – Water

The above table brings out the t-value and significance for workmanship is 0.04. Since the significance value is less than 0.05, the mean difference in the perception of water hand painting technique for sarees across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of water hand painting technique for Sarees across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted

3.9.3.15. Paired Sample T-Test - Water Technique – Accessories

Objective: To know significant differences in the perception of water hand painting technique for accessories across the type of silk (crepe/chiffon)

H₀: The perception of water hand painting technique for accessories is same across the type of silk (crepe/chiffon)

H_A: The perception of water hand painting technique for accessories differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Accessories Technique: Water	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.21	0.87	0.09	-2.22	0.03
	Chiffon	100	4.37	0.75	0.07		
Pair 2 – Colour	Crepe	100	4.21	0.92	0.09	1.00	0.32
	Chiffon	100	4.12	0.71	0.07		
Pair 3 - Workmanship	Crepe	100	4.15	0.87	0.09	-1.29	0.20
	Chiffon	100	4.26	0.73	0.07		
Pair 4 – Handle	Crepe	100	4.30	0.80	0.08	1.09	0.28

	Chiffon	100	4.22	0.79	0.08		
Pair 5 - Overall Appearance	Crepe	100	4.19	0.97	0.10	1.05	0.30
	Chiffon	100	4.11	0.87	0.09		

Table 3.41: Accessories – Water

The above table brings out the t-value and significance for Design is 0.03. Since the significance value is less than 0.05, the mean difference in the perception of water hand painting technique for Accessories across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of water hand painting technique for Accessories across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.16. Paired Sample T-Test - Urea Technique – Kurti

Objective: To know significant differences in the perception of urea hand painting technique for kurtis across the type of silk (crepe/chiffon)

H₀: The perception of urea hand painting technique for kurtis is same across the type of silk (crepe/chiffon)

H_A: The perception of urea hand painting technique for kurtis differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Kurtha Technique: Urea	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.19	0.92	0.09	-0.56	0.58
	Chiffon	100	4.25	0.93	0.09		
Pair 2 – Colour	Crepe	100	3.97	1.17	0.12	-1.05	0.29
	Chiffon	100	4.08	1.10	0.11		
Pair 3 – Workmanship	Crepe	100	4.00	0.85	0.09	-2.07	0.04
	Chiffon	100	4.23	0.92	0.09		
Pair 4 – Handle	Crepe	100	4.00	0.91	0.09	-0.96	0.34
	Chiffon	100	4.08	1.05	0.11		
Pair 5 - Overall Appearance	Crepe	100	3.95	1.05	0.10	-1.70	0.09
	Chiffon	100	4.13	1.02	0.10		

Table 3.42: Kurti – Urea

The above table brings out the t-value and significance for workmanship is 0.04. Since the significance value is less than 0.05, the mean difference in the perception of Urea hand painting technique for kurtis across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Urea hand painting technique for kurtis across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.17. Paired Sample T-Test - Urea Technique – Saree

Objective: To know significant differences in the perception of urea hand painting technique for sarees across the type of silk (crepe/chiffon)

H₀: The perception of urea hand painting technique for sarees is same across the type of silk (crepe/chiffon)

H_A: The perception of urea hand painting technique for sarees differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Saree Technique: Urea	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.27	0.86	0.09	1.91	0.06
	Chiffon	100	4.12	0.91	0.09		
Pair 2 – Colour	Crepe	100	3.89	1.02	0.10	0.00	1.00
	Chiffon	100	3.89	1.01	0.10		

Pair 3 - Workmanship	Crepe	100	3.87	0.98	0.10	-0.84	0.40
	Chiffon	100	3.95	0.97	0.10		
Pair 4 – Handle	Crepe	100	4.01	0.90	0.09	1.26	0.21
	Chiffon	100	3.90	0.96	0.10		
Pair 5 - Overall Appearance	Crepe	100	3.96	1.03	0.10	0.22	0.83
	Chiffon	100	3.94	0.92	0.09		

Table 3.43: Saree – Urea

The significance value is more than 0.05, for other pairs, the mean difference in the perception of Urea hand painting technique for Sarees across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted

3.9.3.18. Paired Sample T-Test - Urea Technique – Accessories

Objective: To know significant differences in the perception of urea hand painting technique for accessories across the type of silk (crepe/chiffon)

H₀: The perception of urea hand painting technique for accessories is same across the type of silk (crepe/chiffon)

H_A: The perception of urea hand painting technique for accessories differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Accessories Technique: Urea	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.55	0.56	0.06	2.26	0.03
	Chiffon	100	4.41	0.73	0.07		
Pair 2 – Colour	Crepe	100	4.35	0.83	0.08	0.10	0.92
	Chiffon	100	4.34	0.76	0.08		
Pair 3 – Workmanship	Crepe	100	4.26	0.81	0.08	-0.78	0.44
	Chiffon	100	4.31	0.84	0.08		
Pair 4 – Handle	Crepe	100	4.32	0.80	0.08	0.54	0.59
	Chiffon	100	4.29	0.84	0.08		
Pair 5 - Overall Appearance	Crepe	100	4.18	0.85	0.08	-2.16	0.03
	Chiffon	100	4.30	0.83	0.08		

Table 3.44: Accessories – Urea

The above table brings out the t-value and significance for Design and overall appearance is 0.03. Since the significance value is less than 0.05, the mean difference in the perception of Urea hand painting technique for Accessories across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Urea hand painting technique for Accessories across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.19. Paired Sample T-Test - Batik Technique – Kurti

Objective: To know significant differences in the perception of batik hand painting technique for kurtis across the type of silk (crepe/chiffon)

H₀: The perception of batik hand painting technique for kurtis is same across the type of silk (crepe/chiffon)

H_A: The perception of batik hand painting technique for kurtis differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Kurtha Technique: Batik	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	3.88	1.13	0.11	-1.41	0.16
	Chiffon	100	4.04	1.23	0.12		
Pair 2 – Colour	Crepe	100	3.76	1.22	0.12	-2.24	0.03

	Chiffon	100	4.05	1.23	0.12		
Pair 3 - Workmanship	Crepe	100	3.67	1.13	0.11	-3.84	0.00
	Chiffon	100	4.15	1.02	0.10		
Pair 4 - Handle	Crepe	100	3.97	0.97	0.10	0.08	0.93
	Chiffon	100	3.96	1.00	0.10		
Pair 5 - Overall Appearance	Crepe	100	3.65	1.08	0.11	-2.86	0.01
	Chiffon	100	3.97	1.14	0.11		

Table 3.45: Kurti – Batik

The above table brings out the t-value and significance for colour, workmanship and overall appearance is 0.03, 0.00 and 0.01 respectively. Since the significance value is less than 0.05, the mean difference in the perception of Batik hand painting technique for kurtis across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Batik hand painting technique for kurtis across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.3.20. Paired Sample T-Test - Batik Technique – Saree

Objective: To know significant differences in the perception of batik hand painting technique for sarees across the type of silk (crepe/chiffon)

H₀: The perception of batik hand painting technique for sarees is same across the type of silk (crepe/chiffon)

H_A: The perception of batik hand painting technique for sarees differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Saree Technique: Batik	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 - Design	Crepe	100	4.48	0.70	0.07	2.35	0.02
	Chiffon	100	4.28	0.99	0.10		
Pair 2 - Colour	Crepe	100	4.31	0.85	0.08	2.46	0.02
	Chiffon	100	4.01	1.10	0.11		
Pair 3 - Workmanship	Crepe	100	4.16	0.79	0.08	0.09	0.93
	Chiffon	100	4.15	0.89	0.09		
Pair 4 - Handle	Crepe	100	4.25	0.76	0.08	2.17	0.03
	Chiffon	100	4.04	0.91	0.09		
Pair 5 - Overall Appearance	Crepe	100	4.31	0.76	0.08	0.73	0.47
	Chiffon	100	4.24	0.91	0.09		

Table 3.46: Saree – Batik

The above table brings out the t-value and significance for Design, colour and handle is 0.02, 0.02 and 0.03 respectively. Since the significance value is less than 0.05, the mean difference in the perception of Batik hand painting technique for sarees across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Batik hand painting technique for Sarees across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted

3.9.3.21. Paired Sample T-Test - Batik Technique – Accessories

Objective: To know significant differences in the perception of batik hand painting technique for accessories across the type of silk (crepe/chiffon)

H₀: The perception of batik hand painting technique for accessories is same across the type of silk (crepe/chiffon)

H_A: The perception of batik hand painting technique for accessories differs across the type of silk (crepe/chiffon)

Paired Samples Statistics	Type: Accessories Technique: Batik	Count	Mean	Std. Deviation	Std. Error Mean	t-Value	Sig.
Pair 1 – Design	Crepe	100	4.36	0.72	0.07	-0.88	0.38
	Chiffon	100	4.42	0.73	0.07		
Pair 2 – Colour	Crepe	100	4.39	0.74	0.07	2.10	0.04
	Chiffon	100	4.19	0.79	0.08		
Pair 3 – Workmanship	Crepe	100	4.17	0.77	0.08	-1.58	0.12
	Chiffon	100	4.31	0.80	0.08		
Pair 4 – Handle	Crepe	100	4.19	0.72	0.07	-1.35	0.18
	Chiffon	100	4.28	0.70	0.07		
Pair 5 - Overall Appearance	Crepe	100	4.18	0.85	0.08	0.23	0.82
	Chiffon	100	4.16	0.81	0.08		

Table 3.47: Accessories – Batik

The above table brings out the t-value and significance colour is 0.04. Since the significance value is less than 0.05, the mean difference in the perception of Batik hand painting technique for Accessories across the type of silk (crepe/chiffon) is significant at 5% level. Hence, null hypothesis is rejected and alternate hypothesis is accepted. Since the significance value is more than 0.05, for other pairs, the mean difference in the perception of Batik hand painting technique for Accessories across the type of silk (crepe/chiffon) is not significant at 5% level. Hence, null hypothesis is accepted.

3.9.4. Correlations

3.9.4.1. Correlation –CREPE Silk

Type of customer	Type: Kurti Technique: Gutta Silk: Crepe		Overall Appearance
Textiles	Design	Pearson Correlation	0.082
		Sig. (1-tailed)	0.286
		N	50
	Colour	Pearson Correlation	-.275*
		Sig. (1-tailed)	0.027
		N	50
	Workmanship	Pearson Correlation	.820**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.310*
		Sig. (1-tailed)	0.014
		N	50
Non Textiles	Design	Pearson Correlation	0.140
		Sig. (1-tailed)	0.166
		N	50
	Colour	Pearson Correlation	0.188
		Sig. (1-tailed)	0.096
		N	50
	Workmanship	Pearson Correlation	0.128
		Sig. (1-tailed)	0.187
		N	50
	Handle	Pearson Correlation	.407**
		Sig. (1-tailed)	0.002
		N	50

Table 3.48: Comparison between Textile and Non Textile – Gutta Technique – Crepe

The above table and chart bring out that amongst the textile customers for kurtis / gutta / crepe, the highest satisfaction was recorded with workmanship (at 82.0%), followed distantly by handle (at 31.0%). In case of non-textile customers, it was with handle (at 40.7%), followed by colour (at 18.8%). In case of textile customers, correlation with color was negative and significant (at 5% level). The correlation with workmanship was positive and significant (at 1% level) while that with handle was positive and significant (at 5% level). In case of non-textile customers, correlation with handle was positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Alcohol Silk: Crepe		Overall Appearance
Textiles	Design	Pearson Correlation	0.013
		Sig. (1-tailed)	0.464
		N	50
	Colour	Pearson Correlation	0.149
		Sig. (1-tailed)	0.151
		N	50
	Workmanship	Pearson Correlation	.610**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	0.042
		Sig. (1-tailed)	0.387
		N	50
Non Textiles	Design	Pearson Correlation	.686**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.737**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.914**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.674**
		Sig. (1-tailed)	0.000
		N	50

Table 3.49: Comparison between Textile and Non Textile – Alcohol Technique -Crepe

The above table and chart bring out that amongst the textile customers for kurtis /alcohol/crepe, the highest satisfaction was recorded with workmanship (at 61.0%), followed distantly by colour (at 14.9%). In case of non-textile customers also, it was with workmanship (at 91.4%), followed by colour (at 73.7%). In case of textile customers, correlation with workmanship was positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Salt Silk: Crepe		Overall Appearance
Textiles	Design	Pearson Correlation	0.009
		Sig. (1-tailed)	0.476
		N	50
	Colour	Pearson Correlation	0.123
		Sig. (1-tailed)	0.197
		N	50

	Workmanship	Pearson Correlation	.330**
		Sig. (1-tailed)	0.010
		N	50
	Handle	Pearson Correlation	.555**
		Sig. (1-tailed)	0.000
		N	50
Non Textiles	Design	Pearson Correlation	.850**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.539**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.607**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.801**
		Sig. (1-tailed)	0.000
		N	50

Table 3.50: Comparison between Textile and Non Textile – Salt Technique -Crepe

The above table and chart bring out that amongst the textile customers for kurtis/salt/crepe, the highest satisfaction was recorded with handle (at 55.5%), followed distantly by workmanship (at 33.0%). In case of non-textile customers, it was with design (at 85.0%), followed by handle (at 80.1%). In case of textile customers, correlations with workmanship and handle were positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level)

Type of customer	Type: Kurti Technique: Sugar Silk: Crepe		Overall Appearance
Textiles	Design	Pearson Correlation	.385**
		Sig. (1-tailed)	0.003
		N	50
	Colour	Pearson Correlation	.297*
		Sig. (1-tailed)	0.018
		N	50
	Workmanship	Pearson Correlation	0.013
		Sig. (1-tailed)	0.465
		N	50
	Handle	Pearson Correlation	0.178
		Sig. (1-tailed)	0.108
		N	50
Non Textiles	Design	Pearson Correlation	.444**
		Sig. (1-tailed)	0.001
		N	50

	Colour	Pearson Correlation	.783**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.687**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.795**
		Sig. (1-tailed)	0.000
		N	50

Table 3.51: Comparison between Textile and Non Textile – Sugar Technique -Crepe

The above table and chart bring out that amongst the textile customers for kurtis/sugar/crepe, the highest satisfaction was recorded with design (at 38.5%), followed by colour (at 29.7%). In case of non-textile customers, it was with handle (at 79.5%), followed by colour (at 78.3%). In case of textile customers, correlations with design and colour were positive and significant (at 5% level and 1% level, respectively). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Water Silk: Crepe		Overall Appearance
Textiles	Design	Pearson Correlation	.285*
		Sig. (1-tailed)	0.023
		N	50
	Colour	Pearson Correlation	.457**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.446**
		Sig. (1-tailed)	0.001
		N	50
	Handle	Pearson Correlation	.516**
		Sig. (1-tailed)	0.000
		N	50
Non Textiles	Design	Pearson Correlation	.536**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.520**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.871**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.776**
		Sig. (1-tailed)	0.000
		N	50

Table 3.52: Comparison between Textile and Non Textile – Water Technique -Crepe

The above table and chart bring out that amongst the textile customers for kurtis/water/crepe, the highest satisfaction was recorded with handle (at 51.6%), followed by colour (at 45.7%). In case of non-textile customers, it was with workmanship (at 87.1%), followed by handle (at 77.6%). In case of textile customers, correlation with design was positive and significant at 5% level. In case of all three variables, correlations were positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Urea Silk: Crepe		Overall Appearance
Textiles	Design	Pearson Correlation	.252*
		Sig. (1-tailed)	0.039
		N	50
	Colour	Pearson Correlation	0.174
		Sig. (1-tailed)	0.113
		N	50
	Workmanship	Pearson Correlation	.560**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	0.093
		Sig. (1-tailed)	0.260
		N	50
Non Textiles	Design	Pearson Correlation	.713**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.829**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.489**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.872**
		Sig. (1-tailed)	0.000
		N	50

Table 3.53: Comparison between Textile and Non Textile – Urea Technique -Crepe

The above table and chart bring out that amongst the textile customers for kurtis/urea/crepe, the highest satisfaction was recorded with workmanship (at 56.0%), followed by design (at 25.2%). In case of non-textile customers, it was with handle (at 87.2%), followed by colour (at 71.3%). In case of textile customers, correlation with design was positive and significant at 5% level. In case of workmanship, correlation was positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Batik Silk: Crepe		Overall Appearance
Textiles	Design	Pearson Correlation	0.100
		Sig. (1-tailed)	0.244
		N	50
	Colour	Pearson Correlation	0.181
		Sig. (1-tailed)	0.104
		N	50
	Workmanship	Pearson Correlation	.452**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.240*
		Sig. (1-tailed)	0.046
		N	50
Non Textiles	Design	Pearson Correlation	.890**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.606**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.767**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.570**
		Sig. (1-tailed)	0.000
		N	50

Table 3.54: Comparison between Textile and Non Textile – Batik Technique -Crepe

The above table and chart bring out that amongst the textile customers for kurtis/batik/crepe, the highest satisfaction was recorded with workmanship (at 45.2%), followed by handle (at 24.0%). In case of non-textile customers, it was with design (at 89.0%), followed by workmanship (at 76.7%). In case of textile customers, correlation with handle was positive and significant at 5% level. In case of workmanship, correlation was positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

3.9.4.2. Correlations – Chiffon

Type of customer	Type: Kurti Technique: Gutta Silk: Chiffon		Overall Appearance
Textiles	Design	Pearson Correlation	.749**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.419**
		Sig. (1-tailed)	0.001
		N	50

	Workmanship	Pearson Correlation	.858**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.530**
		Sig. (1-tailed)	0.000
		N	50
Non Textiles	Design	Pearson Correlation	.633**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.507**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.704**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.809**
		Sig. (1-tailed)	0.000
		N	50

Table 3.55: Comparison between Textile and Non Textile – Gutta Technique -Chiffon

The above table and chart bring out that amongst the textile customers for kurtis/gutta/chiffon, the highest satisfaction was recorded with workmanship (at 85.8%), followed by design (at 74.9%). In case of non-textile customers, it was with handle (at 80.9%), followed by workmanship (at 70.4%). In case of textile and non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Alcohol Silk: Chiffon		Overall Appearance
Textiles	Design	Pearson Correlation	.237*
		Sig. (1-tailed)	0.049
		N	50
	Colour	Pearson Correlation	-0.025
		Sig. (1-tailed)	0.431
		N	50
	Workmanship	Pearson Correlation	.515**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	0.016
		Sig. (1-tailed)	0.457
		N	50
Non Textiles	Design	Pearson Correlation	.805**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.749**

	Workmanship	Sig. (1-tailed)	0.000
		N	50
		Pearson Correlation	.745**
	Handle	Sig. (1-tailed)	0.000
		N	50
		Pearson Correlation	.504**
		Sig. (1-tailed)	0.000
		N	50

Table 3.56: Comparison between Textile and Non Textile – Alcohol Technique - Chiffon

The above table and chart bring out that amongst the textile customers for kurtis/alcohol/chiffon, the highest satisfaction was recorded with workmanship (at 51.5%), followed by design (at 23.7%). In case of non-textile customers, it was with design (at 80.5%), followed by workmanship (at 74.5%). In case of textile customers, correlation with design was positive and significant at 5% level. In case of workmanship, correlation was positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Salt Silk: Chiffon		Overall Appearance
Textiles	Design	Pearson Correlation	.392**
		Sig. (1-tailed)	0.002
		N	50
	Colour	Pearson Correlation	.574**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.835**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.867**
		Sig. (1-tailed)	0.000
		N	50
Non Textiles	Design	Pearson Correlation	.447**
		Sig. (1-tailed)	0.001
		N	50
	Colour	Pearson Correlation	.753**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.539**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.822**
		Sig. (1-tailed)	0.000
		N	50

Table 3.57: Comparison between Textile and Non Textile – Salt Technique - Chiffon

The above table and chart bring out that amongst the textile customers for kurtis/salt/chiffon, the highest satisfaction was recorded with handle (at 86.7%), followed by workmanship (at 83.5%). In case of non-textile customers, it was with handle (at 82.2%), followed by colour (at 75.3%). In case of textile and non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Sugar Silk: Chiffon		Overall Appearance
Textiles	Design	Pearson Correlation	0.126
		Sig. (1-tailed)	0.192
		N	50
	Colour	Pearson Correlation	.253*
		Sig. (1-tailed)	0.038
		N	50
	Workmanship	Pearson Correlation	.733**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.819**
		Sig. (1-tailed)	0.000
		N	50
Non Textiles	Design	Pearson Correlation	.702**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.857**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.883**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.655**
		Sig. (1-tailed)	0.000
		N	50

Table 3.58: Comparison between Textile and Non Textile – Sugar Technique - Chiffon

The above table and chart bring out that amongst the textile customers for kurtis/sugar/chiffon, the highest satisfaction was recorded with handle (at 81.9%), followed by workmanship (at 73.3%). In case of non-textile customers, it was with workmanship (at 88.3%), followed by colour (at 85.7%). In case of textile customers, correlation with colour was positive and significant at 5% level. In case of workmanship and handle, correlations were positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Water Silk: Chiffon		Overall Appearance
Textiles	Design	Pearson Correlation	.402**
		Sig. (1-tailed)	0.002
		N	50
	Colour	Pearson Correlation	.348**
		Sig. (1-tailed)	0.007
		N	50
	Workmanship	Pearson Correlation	.380**
		Sig. (1-tailed)	0.003
		N	50
	Handle	Pearson Correlation	.315*
		Sig. (1-tailed)	0.013
		N	50
Non Textiles	Design	Pearson Correlation	-0.017
		Sig. (1-tailed)	0.452
		N	50
	Colour	Pearson Correlation	.801**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.670**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.639**
		Sig. (1-tailed)	0.000
		N	50

Table 3.59: Comparison between Textile and Non Textile – Water Technique - Chiffon

The above table and chart bring out that amongst the textile customers for kurtis/water/chiffon, the highest satisfaction was recorded with design (at 40.2%), followed by workmanship (at 38.0%). In case of non-textile customers, it was with colour (at 81.0%), followed by workmanship (at 67.0%). In case of textile customers, correlations with all the variables were positive and significant (except handle, which was at 5% level, all others were at 1% level). In case of non-textile customers, except for design,

Type of customer	Type: Kurtha Technique: Urea Silk: Chiffon		Overall Appearance
Textiles	Design	Pearson Correlation	.397**
		Sig. (1-tailed)	0.002
		N	50
	Colour	Pearson Correlation	0.152
		Sig. (1-tailed)	0.146
		N	50

	Workmanship	Pearson Correlation	.787**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.241*
		Sig. (1-tailed)	0.046
		N	50
Non Textiles	Design	Pearson Correlation	.890**
		Sig. (1-tailed)	0.000
		N	50
	Colour	Pearson Correlation	.805**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.898**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.857**
		Sig. (1-tailed)	0.000
		N	50

Table 3.60: Comparison between Textile and Non Textile – Urea Technique - Chiffon

The above table and chart bring out that amongst the textile customers for kurtis/urea/chiffon, the highest satisfaction was recorded with workmanship (at 78.7%), followed by design (at 39.7%). In case of non-textile customers, it was with workmanship (at 89.8%), followed by design (at 89.0%). In case of textile customers, correlations with design and workmanship were positive and significant (at 1% level). The correlation with handle was positive and significant (at 5% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

Type of customer	Type: Kurti Technique: Batik Silk: Chiffon		Overall Appearance
Textiles	Design	Pearson Correlation	.383**
		Sig. (1-tailed)	0.003
		N	50
	Colour	Pearson Correlation	0.232
		Sig. (1-tailed)	0.052
		N	50
	Workmanship	Pearson Correlation	.754**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.463**
		Sig. (1-tailed)	0.000
		N	50
Non Textiles	Design	Pearson Correlation	.796**
		Sig. (1-tailed)	0.000
		N	50

	Colour	Pearson Correlation	.837**
		Sig. (1-tailed)	0.000
		N	50
	Workmanship	Pearson Correlation	.753**
		Sig. (1-tailed)	0.000
		N	50
	Handle	Pearson Correlation	.887**
		Sig. (1-tailed)	0.000
		N	50

Table 3.61: Comparison between Textile and Non Textile – Batik Technique - Chiffon

The above table and chart bring out that amongst the textile customers for kurti / batik / chiffon, the highest satisfaction was recorded with workmanship (at 75.4%), followed by handle (at 46.3%). In case of non-textile customers, it was with handle (at 88.7%), followed by colour (at 83.7%). In case of textile customers, correlations with design, workmanship and handle were positive and significant (at 1% level). In case of non-textile customers, correlations with all the variables were positive and significant (at 1% level).

CHAPTER IV

4. Summary and Conclusion

“Green is the prime color of the world and that from which its loveliness arises.” -Pedro Calderon de la Barca.

In the era characterized by a variety of expressions that accompany the development of technology, the diversity of designs and the emergence of new techniques, patterns of consumption and mobility. Going green is the new way to satisfy needs, and now the eco-friendly minds and products get their much awaited attention.

Silk Painting is creating art on fabrics. Hand painting has been one of the most popular creative art forms from time immemorial. Eco friendly hands painted silks create an interest, add beauty to the fabrics. The dyes that are used do not cause any harm to the ecology and are biodegradable. Silk painting is rapidly gaining importance among surface designers, fine artists, and crafts people. The pure, transparent colors of the dyes, combined with the luxuriant drape of the silk itself, combines to make this a uniquely sensuous medium. The present hand painting technique does not require skill and knowledge of painting, where as other painting that are prevalent in India require knowledge of drawing and painting.

As we see green product development bring with it unique cultural, operation and execution challenge, opines Gregory Unruh (2010) Green products generally use eco-friendly materials and energy-efficient means of production, thereby causing less or no detrimental impact on the environment. Moreover, green products are usually biodegradable and made from recyclable materials. They also conserve energy by promoting renewable or natural energy sources and low-maintenance energy requirements.

According to a report in sustainable fashion “The fabrics used are block printed by hand using eco-friendly vegetable dyes and made through traditional artisan craftsmanship.”

The present research on hand painting on silks with eco-friendly dyes on silk crepe and silk chiffons, a multifaceted art was developed using seven different hand painting techniques. The techniques were incorporated based on a pilot study conducted and it was evident that these techniques of hand painted fabrics or apparel were not available in the market and that the consumers were left looking for new designs and trendy apparels which are eco friendly.

The main objectives of the study were to hand paint silks with eco friendly dyes through various techniques, and to design and develop a collection of Kurtis, sarees with blouses along with accessories for women of 18 -30 years. The developed hands painted apparels were branded under the name “Eco - Moiré “simply beautiful.”

The silk crepe and silk chiffon fabric were washed before painting for removing sizing materials and ironed with steam iron while it was still, damp. The fabrics were ready for painting and were stretched on the harite (two long strips of wood with brass nails holding the fabric firm) these can be adjusted to any length. Each hand painting technique has uniqueness of its own. Painting on silk began with a luxurious base fabric like white crepe silk and silk chiffon.

In the Gutta technique a water based resist was used and the resists stopped the flow of dye and created a barrier which made an outline of an image.

In the alcohol technique the dyes were painted on to the fabric and when it was semidry, drops of ethyl alcohol were dropped using dropper and a three dimensional pattern was formed.

In salt technique, the silk was painted with dye and crystal salt was sprinkled on to the painted surface when it was still wet. The dye pulled the salt creating burst of colour exploding from the nucleus where the salt was positioned.

The sugar technique was same as the salt technique but instead of salt, sugar crystals were sprinkled when still wet, and rain drop effect was created which was not as bold as the salt technique.

In the water technique the dye was applied on to the wet fabric and merging of colors took place and a beautiful colour combination was formed.

In the urea technique the dye was painted and little amount of urea was sprinkled on to the fabric. The urea crystals pulled the dye and created a three dimensional effect.

In the innovative batik technique the crepe silk and silk chiffon fabrics were painted with wax using tjanting, allowed to dry and then the dye was painted on the fabric and allowed to dry again. The fabrics were twisted to give the crackled effect and were then painted to get the perfect batik effect. Then the fabrics were soaked in hot water to remove the wax. The painted fabrics of all the techniques were subjected to steaming for 1 hour at 40 °C so that the dyes were fixed on to the fabrics.

The hand painted fabrics were tested for handle, mechanical and performance properties and to check them for various end uses. The hand painted fabrics were used for the design and development of Kurtis, sarees, blouses and accessories. The designed apparels were introduced to the consumers under the brand name "Eco Moiré" 'Simply beautiful.' Under-privileged women were trained with these different hand painting techniques and it was found that, the hand painting technique was easy, simple and the trained women felt that they could be self reliant with little effort. Both the textile and non-textile respondents were surveyed to study the acceptance of crepe silk and silk chiffon Kurtis, sarees, blouses and accessories. The developed products with special eco-friendly characteristics when introduced into the market will have bright future of using unique hand painted products

5. Findings

5.1. The Following Findings Were Drawn From the Research Work Carried Out

From the pilot study it was evident that the hand painted Kurtis, Sarees and accessories were not available in the market, the ones that were available were the ones which were dyed, printed or woven. There were not much of innovative contemporary designs with special unique hand painting techniques that were available, the ones that were available were the warli designs which emphasized tribal motifs and kalamkari designs which emphasized creepers and mythological stories and were available only in cotton fabrics. From the study it was found that there was much scope for hand painting with eco friendly dyes with contemporary designs with varied style features on hand painted silks which were more refreshing and appealing to the consumer with commercial feasibility.

Fabrics were the integral part of design and development of apparels. The manufacturers and retailers were of the opinion that hand painting with innovative designs and colour combinations and functionality were the demand of today's consumers. Consumers were of the opinion that fit, textures; comfort and feel were some of the factors that they looked for during the purchase of Kurtis, sarees and accessories.

It was apparent from the study that, there was great demand for the hand painted Kurtis, sarees and accessories. Any new innovation in design and colour that were eco friendly in nature could be implemented to meet the demands of present day consumers who lay great emphasis on eco-friendly products. These products would be in great demand in the domestic and global market.

The geometrical properties of the greige and the painted silk fabrics were compared and it was clear that the weight of the hand painted samples had reduced after painting as the fabrics was subjected to washing process for the removal of residual gum and other impurities present in the greige fabric. The thickness of the painted silk crepe remained unchanged, where as the silk chiffon had reduced minimally. The overall geometrical properties of the painted samples have brought the closeness and consolidation of the fabric sett.

Evaluation of the eco parameters of the selected dyes was done for determination of banned amines. The result showed that the dyes used in the painted samples did not contain any of the banned amines as per the German Regulation. Hence the selected dyes were found to be 100% eco friendly.

Assessment on the quality aspects of painted fabrics was carried out and it was found that the painted samples displayed considerable dimensional stability within the range of 1.5% to 2.1% which is well within the standard limit of $\pm 5\%$. Hence both chiffon and crepe fabrics reported good improvement in dimensional stability after painting and better ability to withstand wear and tear which is essential for apparels.

With regard to the degree of pilling for both unpainted and painted silk chiffon and crepe silk fabrics samples showed the same pilling rating of 5 (5-No change), therefore the painting treatment had not affected this property of the fabrics.

Drape co-efficient along with colour, luster and texture is an important factor affecting the aesthetic and dynamic functionality of fabrics. A low Drape co-efficient indicated easy deformation of a fabric and a high drape coefficient indicated less deformation. It was clearly evident that the painted samples displayed considerable drapability within the range of ± 0.5 in comparison with the unpainted fabrics in case of both silk chiffon and crepe silk fabrics. Hence both silk chiffon and crepe silk fabrics reported good drapability after painting which is essential for apparels.

Spectrophotometric assessment of painted fabrics for colour measurement and colour coordinates was carried out for the base colours that were standardized for painting. The K/S values and the strength value of the colours used varied from 114% to 389 % which clearly indicates that the colours shades used were ranging from light to dark shades.

The test for colour fastness properties to washing was carried out, and it was evident that both silk chiffon and crepe silk samples painted using different techniques showed good to excellent colour fastness properties, except the chiffon silk painted using salt technique which showed a fair colour fastness property to washing and crepe silk using urea technique which showed a fair to good colour fastness property to washing.

Colour fastness to rubbing under dry and wet condition. It showed that both silk chiffon and crepe silk samples painted using different techniques showed good to excellent colour fastness properties to rubbing both in the dry and wet condition.

Regarding colour fastness to sunlight, chiffon samples painted using different techniques showed fair to excellent colour fastness properties to sunlight, whereas the crepe silk fabric painted using different techniques showed good to excellent colour fastness properties to sunlight.

PH value and colour fastness to perspiration depicts that both silk chiffon and crepe silk samples painted using different techniques showed good to excellent colour fastness properties to perspiration both in acidic and alkaline conditions.

Subjective analysis with respect to smoothness of crepe silk and silk chiffon clearly showed that the painting process had improved and increased the smoothness. The fabrics had improved and there was an increase in the smoothness and cover factor for both the fabrics which led to a compressible feel in the fabrics.

Subjective analysis with respect to softness of crepe silk and silk chiffons showed that painting process on crepe and chiffon fabrics had improved the softness and cover factor of the fabrics. It consequently made the fabrics soft and led to a lustrous feel of the fabrics.

Subjective analysis with respect to stiffness of both crepe silk and silk chiffon depicted that the painting process had no change on the stiffness of both fabrics. The fabrics hadn't increased in terms of bending properties. Lower stiffness value meant that the handle had improved after painting.

The body measurements of young women in the age group of 18-30 years were standardized and the study showed that apart from the bust and waist measurements which were less than the standards, the rest of the measurements were almost similar for the Kurtis. These measurements were used to design and develop the Kurtis, sarees and blouses. The accessories were developed from the cut fabrics that were used to create kurtis, sarees and blouses to show environmental sustainability.

The Apparels were designed according to the derived standardized body measurements which contained all the design features in detail, keeping in mind the four important factors like comfort, functionality, fit and aesthetic appeal. The designs had various structural details such as frills, princess line, yokes, collar, gathers and fullness. The developed hand painted fabrics were designed based on various functional parameters like style, comfort and fit. The garments were designed to suit the present day customer needs and as per today's trend.

A survey was conducted through an exhibition which was organized to study the acceptance of the designed and developed hand painted silks using eco-friendly dyes among Textile and non Textile respondents from the statistical Analysis it was concluded that eco-friendly hand painted silks had Good Correlation between the textiles and non textiles respondents. According to the results of Independent 'T' Test, the perception of design and colour dimension of various hand painting techniques used on silks for Kurtas, sarees and accessories differs across the type of fabric for both textiles and non textiles respondents. According to the results of Paired Sample T-Test for different characteristics, except for urea technique on sarees, all other techniques differs across the type of silk used.

The study emphasized on the different hand painting techniques to design and develop Kurtis, sarees, blouses and accessories using crepe silk and silk chiffons there by making it suitable for apparels which would permit the consumers to perform daily activities while wearing them. The decorative elements were also designed keeping in mind the end use of the apparels. These hand painting techniques enhanced the surface value of crepe silk and silk chiffons there by making it a diverse art, unique and a good entrepreneurial venture with good job opportunities for women to work from home to earn their livelihood.

Similar results were found in Sylvia's study (2013) "Textiles art is very much affected by the choice of material, choosing the dye to paint. The work is a combination of figurative and abstract techniques used to create a visual image which is very earthy and looks very much inspired by traditional native arts."

The results of this study show that customers can be motivated to go for green fashion by increasing their level of awareness about the merits of eco-friendly clothes on one hand and environmental hazards of the production process involved in non-eco-friendly fabrics on the other hand. This can increase the demand for green fashion in the market which may put pressure on textile industry to opt more for eco-friendly fabrics. The green fashion feels fresh, renewed, like a tree blossoming in spring. Back to nature is the forecast for spring summer 2014.

According to Wei Chen (2011) "Second design means to present a modern life in traditional materials or process with aesthetic value through the application of modern science and concept of modern art."

Hence it can be concluded that hand painted crepe silk and silk chiffon with different techniques was well accepted by consumers. The trained under privileged women were of the opinion that this could be a good prospect for self employment with a potential of being a small scale industry in itself with good export market. It is a good entrepreneurial venture with minimal investment and training.

6. References

1. Ajit Mookerjee (1996), "5000 Designs And Motifs From India" Dover Publications Inc, New York, Pg no.7-8
2. Arthur Price, Allen C Cohen (1997), "Fabric science" Fairchild Publications, ISBN- 1-56367-004-6
3. A.Unnikrishnan (2001), "Eco parameters of Textiles an Over view", NCUTE Publications Pg no.79-84
4. Anna Jacob Thomas (2004), "The Art Of Sewing", UBS Publishers Distributors Ltd., New Delhi, Pg no.151-160
5. J Hall (2006), "The Standard Handbook of Textile", Published by Heywood Books, London Pg no. 316
6. Aditi Rajan, M.P.Rajan (2007), "Crafts of India- Hand Made in India" Council of Handicrafts Development Corporation (COHANDS), New Delhi, Pg no.445
7. Benard P Corbman (1983), "Textiles Fibres to fabric" Mc Graw Hill International Editions, ISBN-0-07-013137-6, Pg no. 297, 301, 303,574
8. B.Renate Henge edited by Pam Dawson O (1990) "Inspiration silk painting from Nature", Published in Great Britain, Search press limited, Pg no. 66
9. B.N.Goswamy (2000), "Indian costumes in the collection of the calico museum of textile", volume V, second edition, calico museum of textile, Ahmadabad, ISBN- 81-86980-11-3
10. B P Saville (2000), "Physical Testing of Textiles" Woodhead Publishing ltd, Cambridge England, ISBN 0-8493-0568-3, ISBN 1 85573 3676
11. B.N.Goswamy (2002), "Indian Costume-II", Calico Museum of Textiles Publications, ISBN: 81-86980-24-5, Pg no. 51-58
12. Bhatnagar Parul (2004), "Traditional Indian Costumes and Textiles", Abhishek Publications, Chandigarh India, Pg no.84
13. B.Purshothama (2006), "Quality Management in Garment Industry" ISTE – working professional learning projects AICTE project, ISBN-81-89731-14-9, pg no. 297
14. B N Goswamy (2006), "Indian Costumes in the collection of the Calico Museum of Textiles", Published by D S Mehta on Behalf of Calico Musuem of Textiles, Pg no. 198
15. Lexi Sundell (2007), "The Acrylic Flower Painter's A to Z An illustrated directory of techniques for painting 40 popular flowers" Published by search press ltd well wood, Pg no. 06
16. Billie J. Collier, Martin J. Bide, and Phyllis G Billie J. Collier, Martin J. Bide, and Phyllis G.(2009), "Understanding of Textiles", Pearson Publishers, ISBN 978-0-13-118770-2, ISBN 0-13-118770-8
17. Comaraswamy, Ananda K (1999), "Introduction to Indian Art", Munshiram Manoharlal, New Delhi, ISBN 81-215-0389-2, Pg no. 68-70
18. Census of India (2001), "The Scheduled Tribes of Dadra and Nagar Haveli"
19. Comaraswamy, Ananda K (2003), "History of Indian and Indonesian Art", Kessinger Publishing, ISBN 978-07661-5801-6, Pg no. 88
20. Celia Stall Meadows (2004), "Know your Fashion Accessories", Fair Child Publications, New York
21. Caroline Jasper, (2005), "Power color", copyright, Watson-Guptill Publications, Pg no. 6, 7, 8
22. Charlotte Mankey Calasibetta and Phyllis Tortora, (2005) "Dictionary of Fashion" Fairchild Publication, Pg no.34
23. Carol Brennan (2006), "Fashion, Costume and culture", Thomas gale Publications, Pg no. 79
24. Diane Tuckman, Jan Janas, (1992), "The Complete Book Of Silk Painting"
25. Daniela Mascetti & Amanda Triossi, (1999), "Earrings- From Antiquity to the Present", Thames and Hudson Publications, London.
26. Durga Deulkar (2002), "Household Textiles & Laundry Work", Atma Ram & Sons kashmere gate, Delhi, Pg no. 190 – 195.
27. David A. Lauer (2002), "Design Basics" 5th Edition, COP Wadsworth Thomson learning Publications. Inc, USA, Pg no. 4,5
28. Dr. Parul Bhatnagar (2004), "Decorative Design History in Indian Textiles and Costumes" Abhishekh Publications, Chandigarh, India
29. Florence Muller (2009), "Costume Jewellery for Haute Couture", Thames and Hudson, ISBN: 0-500-51335-X
30. Guru Mallesh Prabhu (2001), "Approaches in Eco-Friendly Textile", NCUTE Publications, Pg no. 15-18
31. Gillian Holman (2005), "Pattern Cutting Made Easy, A step – by – step introduction", Bats ford Ltd. ISBN: 0713480939, Pg no. 38
32. Gillow J & Barnard.N (2005) "Indian Textiles", Thames and Hudson Publications, UK, Pg no.1-29
33. Goworek, H (2007), "Careers in Fashion & Textiles", Blackwell Publishing, UK.
34. Gillow, J & Barnard.N (2008) "Indian Textiles", Thames and Hudson Publications, UK, Pg no.58-62
35. Houghton Mifflin Company (2009), "The American Heritage®" Dictionary of the English Language", Fourth Edition copyright, Published by Houghton Mifflin Company.
36. Irene Emery (1966), "The primary structures of fabrics", British library cataloguing- Inc. ISBN 0-500-01623-2
37. Injoo Kim and Mykyung Uh (2002), "Apparel marketing in fashion Design", Fairchild Publications, Pg no.430
38. J.E Booth (1996) "Principles of Textile Testing" CBS publishers and distributors, New Delhi, ISBN 81-239-0515-7, ISBN 0-592-0632-9

39. John Irwin and Margret Hall (2000), "Indian Painted and Printed Fabrics", Calico Museum, Ahmadabad, ISBN: 81-86980-11-3, Pg no.72-84
40. Jill Kennedy and Jane Varrall (2004) "Silk painting techniques and ideas", B.T.Batsford, London, ISBN: 0-7134-6482-8, Pg no.88-137
41. Jacquie Wilson (2004), "Textile Design – Principles, Processes and Practices", CRC Publisher, USA
42. J.M. Rogers (2006)," Mughal Miniatures", Interlink Books Publications, India, ISBN-13: 978-1566566582, Pg no.22-27.
43. Janice Greenberg Ellinwood (2011), "Fashion by Design", Fairchild Books, A Division of Conde Nast Publications, New York
44. J J Pizzuto, Arthur Price & Allen C. Cohen(1997), "Fabric Science", Fairchild Publication, New York, ISBN:1-56367-004-6, Pg no.164
45. K S Singh(2008), "People of India, Rajasthan part 1" Published by Popular Prakashan, Pg no.48 -60
46. Krishna Chaitanya (1987), "Pahari centres Arts of India", Published by Abhinav Publications, ISBN 81-7017-209-8, Pg no.62
47. Kazz Ball and Valerie Janitch(1999), " Hand Painted Textiles for the Home", British Library Publications, ISBN 0-7153-9400-2, Pg no.50
48. K. Prakash (2003), "Kalamkari figures and designs", English edition Publishers and distributors (India), Pvt. Ltd, ISBN 81-87853-64-6
49. Keith Slater (2003), "Environmental Impact of Textiles", Wood head Publishing Ltd, England, ISBN 1 85573 541 5, 0-8493-1778-9, Pg no.81
50. Kumar Suresh Singh, Rajendra Behari Lal(2003), "Anthropological Survey of India" Popular Prakashan, Gujarat, ISBN 81-7991-106-3, 9788179911068, Pg no.1431-1438.
51. Kath Russan (2004), " Handmade SILK paper", Search Press Publishions, ISBN 0 85532 8932, Pg no. 22
52. K. Prakash (2004), "Indian Fashion Designs" English Edition Publishers and distributors Pvt Ltd, India, Pg no.11
53. Khan Mohammed Jaffer (2006), "Indian Embroidery, Ethnic and Beyond," Super Book House, Pg no.5-6
54. Kathryn Best (2010), "The Fundamentals of Design Management", Ingram Publisher services Inc. USA, ISBN 978-2-940411-07-8, 10987654321, Pg no.182.
55. Linda Hynton (2000), "The Sari" Thames and Hudson. ISBN 0-500-28378-8, Pg no.8, 147
56. Morton.W. E, and Hearle J. S. W (1987), "Physical Properties of Textile Fibers", The textile Institute and Butterworth's, Manchester and London, Pg no.56
57. Morton.W. E, and Hearle J. S. W (1993), "Physical Properties of Textile Fibers", The textile Institute and Butterworth's, Manchester and London, Pg no.34-38.
58. Mary Paul Yates (2002) "Fabrics", W.W. Norton & Company Inc, Singapore, ISBN 0-393-73062-X
59. M.L.Nigam, (1999), "Indian Jewellery", Lustre Press Publications, India.
60. Morton.W. E, and Hearle J. S. W (2003), "Physical Properties of Textile Fibers", The textile Institute and Butterworth's, Manchester and London. Pg no.354-358.
61. M. G. Shashi Bhooshan (2009)," Murals of Kerala", Department of Public Relations Publication, Pg no.16-20.
62. N.Gokerneshan (2005), "Fabric Structure and Design", New Age International Publishers, ISBN: 81-224-1530-X, Pg no.45, 133
63. Olivier Saillard and Anne Zazzo (2012) "Paris Haute Couture", ESFP, Paris, ISBN 978-2-08-020138-6, Pg no.58 – 61
64. Pam Dawson (2002),"The art of Painting on silk", vol-4, Search Press, New York, ISBN: 085532646-8, Pg no.21
65. Phillis Tortora (2005), "Encyclopedia of fashion accessories" Fairchild publications, New York, ISBN NO: 81-8710-737-5, Pg no.46-47
66. P.Angappan and R.Gopalakrishnan, (2010),"Textile Testing", S.S.M.I.T.T staff and student's co-op. stores Ltd. Tamilnadu
67. Paul Garside and Paul Wyeth (2010) "The Effect of Historic Processing Methods on the Stability of Silk Artifacts"
68. Phyllis G. Tortora and Robert S Merkel, (1996), "Fairchild's Dictionary of Textiles", Fairchild Publications, New York, Pg. no. 148
69. Richard Fisher and Dorothy Wolfthal (2000), "Textile print design" third edition Fairchild publications, USA, Pg no. 55-66
70. Roma Bradnock (2004), "Kangra school of painting", Published by Footprint Travel Guides, India, ISBN 1-904777-00-7, Pg no.512
71. Ritu Kumar (2006), "Costumes and Textiles of Royal India", Antique collector's club, edited by Cathy Muscat, India, ISBN - 185149-509-6, Page no 237, 246.
72. Ronald M. Bernier (2008), "Temple arts of Kerala: a South Indian tradition", S. Chand Publication, Pg no. 16-20.
73. Rta Kapur Chishti (2010), "Bihar and west Bengal sari of India", Wiley eastern ltd and co-published by NIFT
74. Robert P. Goldman, Sally J. Sutherland Goldman and Sheldon I. Pollock (2011) "Ramayana by Valmiki illustrated with Indian miniatures from the 16th to the 19th century", Diane de Selliers Publishers, ISBN:9782903656768
75. Stone Elaine (2002), "The Dynamics of Fashion", Fair child Publication, New York, Pg no.93-120

76. Stone Elaine (2008), "The Dynamics of Fashion" third edition Fairchild Books, A Division of Conde Nast Publications, New York. Pg no. 270
77. Susan Meller and Joost Elffers (2003), "Textile Designs", Thames and Hudson Ltd, London, Pg no.20
78. Susie Stokoe (2003), "Silk Painting and Batik", Anness Publishing Ltd, London Pg no.10
79. Satheesam, A (2004), "Textile Arts of India- Vastra", Honesty Publisher & Distributor, Mumbai
80. Sara Pendergast, Tom Pendergast, Sara Hermsen (2004), "Fashion, Costume and Culture" Vol-I, Thomson Gale, UK, ISBN:0-7876-5418-3
81. Susanne Hahn (2004), "A complete guide to silk painting Silk painting" Search press, Pg no.8
82. Shri K.R Zarapkar (2005), "Gala's Zarapkar system of cutting" Navneet Publications India Ltd, Pg no.88
83. Smita Shirole Yadav (2006), "Madhubani" English edition, Publishers and Distributors India, Pvt. Ltd, Mumbai ISBN :81-89066-61-7
84. Sunita Pant Bansal (2007), "History of India" Smriti Books, New Delhi, ISBN:978-81-87967-81-1, Pg no. 43
85. Shakuntala Ramani (2007), "Kalamkari and Traditional Design Heritage of India", Wisdom tree, New Delhi, ISBN 81-8328-082-4, Pg no. 4-9
86. Sandra burkes (2007), "Fashion artists", copyright Burke publishing. Pg no.21
87. Sara J Kadolph (2007), "Textiles", Pearson Publications, ISBN-0-13-118769-4, Pg no. 75, 76,232
88. Susan-Tise-Isore (2009), "High Jewellery" by Cartier Contemporary Creation, Flammarion, US. ISBN:978-2-08-030141-3, Pg no. 182
89. Suhag Shirodkar (2010), "Captured in Miniature: Mughal Lives through Mughal Art", Mapin Publishing Pvt Ltd, ISBN-13: 978-0944142615. Pg. no. 31-35
90. Terence Dalley (1998), "The complete guide to Illustration and design techniques and materials." Chartwell Books Inc, New Jersey
91. Tribhuwan, Robin D Finkenauer, Maik (2003). "Threads Together: A Comparative Study of Tribal and Pre-historic Rock Paintings", Delhi: Discovery Publishing House, ISBN 81-7141-644-6, Pg no. 13-15
92. Usha Srikanth (2002), "Designs for a lifetime - Ethnic embroidery of India", Samatha Enterprises, Mumbai Pg no.11-12
93. Vandana Bhandari (2004), "Costume, textiles and Jewellery of India" Prakash Books, New Delhi, ISBN:81-7234-071-0, Pg no.5-6
94. Venniyoor E.M.J (2008), "Raja Ravi Varma –The most celebrated painter of India", Parsram Mangharam, ISBN: 81-901576-2-0 , Pg no.8
95. Vijai Singh Katiyar (2009), "Indian Saris, Tradition-Perspectives –Design", Wisdom Tree, Pg no.1
96. Winifred Aldrich (2003) "Metric Pattern Cutting for Women's wear", Blackwell Publishing, Pg.45 -54
97. Winifred Aldrich (2008), "Metric Pattern Cutting for Women's wears", Blackwell Publishing. ISBN: 978140575678, Pg no.31 -35
98. Yashodhara Agrawal(2003), "Silk Brocades",Roli & Janssen Publications, ISBN 81-7436-258-4, Pg no.21
99. Zaira and Marcel Mis Collection (2001), "Asian Costumes and Textiles – from the Bosphorus to Fujiyama, Skira Editore S.p.A ", Italy
- 100.Z.J. Grosicki, (2004), "Textile design and Colour", Wood head publishing limited, ISBN 1 85573 995 X, Pg no. 319,322
- 101.Burton, Rob (2005). "Creativity- Method and Process In Digital Fabric Printing: a 21st Century paint brush, Heriot Watt University, Scotland. In: Digital Creativity Journal, Vol.16, No.4, pp.217-230. Routledge Taylor & Francis Group.
- 102.Chakravorty, R., Dutta Pranab & Ghose, J (2009), "Sericulture and Traditional Craft of Silk Weaving in Assam", Indian Journal of Traditional Knowledge, Vol. 9 (2), April 2010, India, Pg no. 378-385.
- 103.Goutham N (2011), "Influence of cocoon characteristics on reeling performance and its yarn properties" Pg no. 3-6
- 104.Glad rags," life style and fashion", October (2007).
- 105.Grazia- Easy Chic (October 2013), "The New Accessories Rule Book", Vol:6, Issue7, A World Wide Media Publication, Fashion Magazine, Pg no.174
- 106.Grazia- Easy Chic (December 2013), "The Cool List 2013", Vol:6, Issue 9, A World Wide Media Publication, Fashion Magazine, Pg no.107
- 107.Klick Fashion, (November 2013), "complete your look with trending accessories", Vol:1, Issue11, A creative connection India Pvt Ltd. Publication, Fashion Magazine, Pg no.22
- 108.L' Official, (November 2013), "classic ideas reinvented", Vol: 12, Issue11, Pvt Ltd. Publication, Fashion Magazine, Pg no.22
- 109.Madhura Nerurkar, Chet Ram Meena & Neha Khurana (2011) "Microbial Dyes: The Undisputed Natural Dyes" Journal of Textile Association, Vol.71, Pg no.338-339
- 110.Namratha, M. & Shailaja D. Naik, 2007, "Contemporized Traditional Textiles Made- ups- A mode For Rural and Urban Linkage", Indian Journal of Traditional Knowledge, Vol. 7(1). January 2008, India, Pg no. 208-211
- 111.Nanje Gowda (2008), "Studies on the post-cocoon parameters as influenced by some physical factors during rearing and spinning of the silkworm Bombyx Mori", Pg no.5, 6

- 112.S.F. Harlapur, S R V R Polytechnic & Dr.T. Ananthkrishnan, (2010) “A New approach for the measurement of Fabric Drapability”, Vol.71, Pg no. 137 – 142
- 113.Harward business review- the magazine June (2010)
- 114.Kim, M.S & Bae, SJ (2003), ‘The study on the characteristics of design through Issey Miyake’s fashion philosophy’, Journal of the Korean Society of Costume, vol. 53, no.6, Pg no.161-173
- 115.Kim, HY & Kim, YI (2006), ‘A study on the characteristics of naturalism in fashion design with the changes of times’, Journal of the Korean Society of Costume, vol.56, no.7, Pg no.31- 41
- 116.Fashion & Style Divya N a freelance fashion – apparel & jewellery designer from NIFT, Magazines/ Journals
- 117.Naik and Vastrad (2008), Indian Journal of traditional Knowledge, Vol-7(I), Pg no. 197-203
- 118.Silk Mark organization of India, “Your Assurance of Pure silk”, Sponsored by CSB (Ministry of Textiles, Govt. of India, Pg no.8
- 119.Suresh (2011), “Comparative study on application of lac dyes on mulberry and non-mulberry silk” Pg no.5-10
- 120.Wei Chen, Meizhen Liu (2011), “Research On Innovation Of Traditional Hand Painted Silk Fabric Through Second Design”, Advanced Material Research , Vol 175/176, Pg no.817
- 121.Ars Textrina, International Textiles Conference, Natural Fibres - A World Heritage In celebration of ‘The International Year of Natural Fibres’ 2nd & 3rd September 2009”
- 122.Indrasen Vencatachellum (2006), “International Dye Symposium” Published by UNESCO Hyderabad India.
- 123.“New complete guide to sewing- step by step techniques for making clothes and home accessories” (2002), Reader’s Digest, Published by Reader’s Digest Association, Canada Ltd, New York.
- 124.Nattadon Rungruangkitkrai, Rattanaphol mongkholrattanasit, “Eco- friendly of textiles dyeing and printing with natural dyes” RMUTP international conference: textiles and fashion 2012 July 3-4 Bangkok Thailand.
- 125.Phyllis G. Tortora & Robert S Merkel (1996),“Dictionary of Textiles”, Fairchild Publications, New York, ISBN-13: 978-0870057076, Pg.no.111
- 126.Simon Black burn (1994), “Oxford Dictionary”, Oxford University Press, New York
- 127.Ashish Kumar Samanta and Adwaita Konar, (2011), “Dyeing with Natural Dyes”, Adey Thani© 2013 The AVA Academia blog -[lynsey](#).
- 128.Allie Comeau, ‘Eco – friendly Fabric Guide’, October 2007, Charu Jain, “Eco- friendly & Recyclable Textiles: Current Scenario and Sustainable Uses”, February 2008, www.neo.ecotextiles.com.
- 129.“Ancient and medieval Indian Cave painting” Wondermonda, 2010, www.encyclopedia.com
- 130.www.allapparel.biz/eco-friendly-cloth.com(2011)
- 131.www.accessoriesdirect.com
- 132.www.britannicencyclopedia.com (2002)
- 133.www.britannicencyclopedia.com (2013)
- 134.www.en.wikipedia.org/wiki/barry_commoner.com(2012)
- 135.www.garmentdesign.com
- 136.www.greenconduct.com sole Hudson (2012)
- 137.www.hilarysimon.com (2012)
- 138.www.lenoeudpapillonblogspot.com(2013)
- 139.www.silkartbywendy.com
- 140.www.oxforddictionaries.com
- 141.www.textileglossary.com
- 142.www.thesmarttime.com eco standards
- 143.www.scientific.net
- 144.www.versonaaccessories.com
- 145.www.thebestdesigns.com
- 146.www.designm.ag/designer.../200-portfolio-sites-webdesign-inspiration
- 147.www.fiber2fashion.com
- 148.www.kangrapainting_britannica.com
- 149.www.socialresearchmethods.net
- 150.www.statisticssolution.com
- 151.www.marcelzairamis.com
- 152.www.pagetwo.com *marcel zaira mis (2001)*
- 153.www.yahoo.com
- 154.www.embroideriesofindia.com
- 155.www.seirratradingpost.com
- 156.www.kangraart.org

157. www.manishmalhotra.org/kurthi
158. www.pattachitra.com
159. www.wondermonda.com
160. <http://www.hand-painted-silk-scarf.com>
161. <http://EzineArticles.com/488797>
162. <http://en.wikipedia.org/wiki/>
163. <http://www.sareez.com/Sarees/By-Fabric/Crepe-Sarees/>
164. <http://fabricsinternational.wetpaint.com/page/Chiffon>
165. [http://en.wikipedia.org/wiki/Chiffon_\(fabric\)](http://en.wikipedia.org/wiki/Chiffon_(fabric))
166. <http://en.wikipedia.org/choli>
167. [http://en.wikipedia.org/wiki/Chiffon_\(fabric\)](http://en.wikipedia.org/wiki/Chiffon_(fabric))
168. <http://www.icsid.org/about/about/articles31.htm>
169. <http://EzineArticles.com/6458240> By Hassan Bamisile February 13,2011
170. <http://en.wikipedi.org/wiki/dhoti>,
171. <http://www.creativequiltkits.com/media/cataglounge/product/cache/1/image>
172. <http://mamtamantra, mamta@archedu.org>
173. <http://wiki.indianfolklore.org/images/d/d3/Mysore.pdf>
174. <http://india.gov.in/knowindia/pattachitra.php>
175. http://craftorissa.com/b2c/product_info.php?products_id=112
176. <http://www.paramparik-karigar.org/bystates/pattachitra.html>
177. <http://www.rabindraart.com/how-to-do-pattachitra.html>
178. http://en.wikipedia.org/wiki/Environmentally_friendly
179. <http://www.in.reset.org/act/sustainable-fashion>
180. <http://www.textileconference.com>
181. http://www.ehow.com/info_8575635_silk-end-uses.html#ixzz2LKpoop6K
182. [http://www.ehow.com/info,sam \(2003\)](http://www.ehow.com/info,sam (2003))
183. [http://greenliving.nationalgeographic.com/ecofriendly/Holzer\(2012\)](http://greenliving.nationalgeographic.com/ecofriendly/Holzer(2012))
184. <http://www.natural-environment.com/blog/tag/eco-friendly-dyes -Unnikrishnan>
185. <http://www.libolon.com/eco-friendly-fabric-2.html>
186. http://en.wikipedia.org/wiki/Environmentally_friendly