



ACHIEVING ENVIRONMENTAL SUSTAINABILITY THROUGH INTERIOR ARCHITECTURE: INTRODUCING RECYCLED PLASTIC IN IKAT

Madireddy Navyatha, Srishti Srivastava

First year student, M.Arch (Interior Design), Asst. Professor, Department of Architecture
Department of Architecture,
JNAFAU, Masab Tank, Hyderabad, Telangana, India.

Abstract: Ikat is a dyeing technique wherein dye resistant bindings or substances resisting dye penetration are applied over yarns in pre-determined patterns and then the threads are dyed. The resulting creation after the weaving of the threads would surface in a lyrical colour extravaganza of finesse and precision. Pochampalli Ikat is mainly popularized in the 1800s. There are two types of ikat namely single ikat and double ikat. In single ikat both wrap or weft threads are dyed in pattern and the others are dyed in solid colour. In double ikat both wrap and weft threads are dyed in pattern. In one form or the other, ikat has been made a practical aspect of every culture. There are too many regions where the specific forms of this dye technique is to cover, but rest assured that you'll find familiar ikat patterns practically everywhere you go in the world.

The main objective is to make ikat fabric from recycled plastic bottles. All the waste and unused plastic bottles are recycled making them sustainable. Ten plastic bottles gives us one pound of polyester fibre. The yarn produced after recycling is sent to weavers for making ikat fabric. The savings made by utilizing low-cost raw materials for recycled products are usually completely eaten up by complex collection and preparation processes. The fabric obtained after weaving can be used to make furniture, rugs, curtains, bed sheets and plethora of things in interior architecture. They have been used in furnishing to provide warmth, comfort, protection and decoration. Fabrics are used a great deal in interiors according to style, theme and decor to dramatically alter the appearance of a bare room. Nevertheless, recycling can still generate attractive profits, as customers are increasingly willing to pay higher prices for sustainable and environmentally-friendly products.

Index Terms - Ikat, Traditional Weaving, Craft, Culture, Sustainable, Interior, Recycling.

I. INTRODUCTION

In last 10 years, 4 trillion plastic bottles were produced around the world. Almost 1 million plastic bottles are purchased every minute. Every hour 54.9 million plastic bottles are produced. Every day 1.3 billion plastic bottles are produced. Every month 40 billion plastic bottles are produced. Every year 481.6 billion plastic bottles are produced. India generates nearly 26,000 tons of plastic waste every day, making it the 15th biggest plastic polluter globally.

Today, the utilization of recycled materials is matter-of-fact, although in virtually no other sector is it quite as advanced as it is in the case of the manufacture of manmade fibers. Compared to using new plastics, utilizing recycled materials can lead to a significant reduction in energy consumption and CO2 emissions. Furthermore, valuable raw material resources such as oil are preserved and the amount of waste at dumps is reduced. The clothing industry is a heavy user of resources and an equally heavy polluter. It is a consumer industry that by its nature encourages people to buy and discard clothing according to the fashion of the day rather than in terms of durability or environmental impact. Environmental fashion, organic fashion, and recycled fabrics are attempts to alter the status quo. Organically produced cotton avoids the use of chemicals and poisons but is still a minority of what is available. The fabric made out of the PET fibre is basically polypropylene and it is ten times stronger than a normal polyester fabric.

Handloom sector is an important second position employer in the country after agriculture by contributing to nearly 30 % of total exports. Pochampally handloom weaving is very popular in Telangana state. Most of the pochampally ikat weavers are located in Nalgonda district. Weaving is a family enterprise where right from the child to the old man in the family get involved in various weaving related activities. Ikat fabric can be made with any textile fiber that takes well to dye. Common traditional ikat materials include silk and wool, but you can also dye rayon, polyester, and a variety of other synthetic fibers the same way. Once the fabric yarn is acquired, it is bunched into thick ropes and dyed in a particular pattern. Then, the bindings are removed, and the yarn is laid flat for weaving. Once the fabric is woven, the pattern that was originally dyed onto the yarn bunch is visible. Like any other textiles, ikat may then be treated, dyed again, or subjected to any number of different processes before it is cut, sewn, packaged, and shipped.

Ikat fabric made from recycled plastic is further used in interiors.

II. RESEARCH METHODOLOGY

PET recycling process

- PET bottles are sorted from other recyclable plastics such as PVC and HDPE, as the reclaimed material (PET flakes) is most valuable when it is most pure.
- Bales of recycled bottles are sorted manually or automatically on the basis of colour, and to remove any foreign material or non-PET lids and bases.
- The plastic is washed in a sterilising bath, after which the clean containers are dried and crushed into tiny flakes.
- The flakes are washed again to ensure the purest possible final product.
- These flakes become the raw material for new products.
- For yarn, the light-coloured flakes are bleached, while flakes from darker bottles are used for yarn that will be dyed a dark colour; the flakes are melted in a vat and forced through spinnerets to produce fibres.

The basic steps in ikat processing are:

- Warp and weft threads are divided into bundles or sets.
- The yarn is then tied with waterproof material, strips of leaf, rubber or plastic to correspond with the pre-arranged design plates.
- The rubber strips used for tying are a modern innovation replacing the traditional method of tying with coarse cotton thread.
- Then the tied bundles are dyed according to design. (This requires several stages of tying and dyeing, depending on the design).
- Ikat or yarn resist dyeing involves the sequence of tying (wrapping) and dyeing sections of bundled yarn to a pre-determined color scheme or pattern, prior to weaving. Thus, the dye penetrates into the exposed sections, while the tied sections remain un-dyed. The patterns achieved by the process on the yarn are then woven into fabric.
- Resists are removed, the yarn threads aligned according to the pattern and put on the loom.



Ikat Weaving

The ikat technique

The Ikat technique allows the weaver to prepare precisely the exact pattern of colors on the finished fabric by wrapping sections of the yarn with rubber strips before dipping it in select dyes. The rubber strips used for tying are a modern innovation replacing the traditional method of tying with coarse cotton thread. The use of resist or barrier to protect certain portions of the yarn or cloth from the dye is a way of enabling several colors to be used on the same textile. There are several resist techniques, such as tie and dye and wax resist batik. But in the Ikat technique, the resist is applied not to the woven fabric, but to the yarn before it is woven. This process involves careful sorting of threads before and after dyeing, and meticulous arrangement of warp and weft threads, so that the pre-dyed sections appear at the right place in the design.

Alteration of bindings and using more than one colour for dyeing produces multi-coloured thread effect. Removal of the bindings and the subsequent weaving of the threads would form the desired pattern woven in the fabric. Ikat is a near universal weaving style common to many world cultures. Likely, it is one of the oldest forms of textile decoration. India, Japan and many South-East Asian nations have weaving cultures with long histories of Ikat production.

III. RESULTS AND DISCUSSION

Worldwide, approximately 7.5 million tons of PET was collected in 2011. This gave 5.9 million tons of flakes. In 2009 3.4 million tons were used to produce fiber, 500,000 tons to produce bottles, 500,000 tons to produce APET sheet for thermoforming, 200,000 tons to produce strapping tape and 100,000 tons for miscellaneous applications. Pet core, the European trade association that fosters the collection and recycling of PET, reported that in Europe alone, 1.6 million tons of PET bottles were collected in 2011 – more than 51% of all bottles. After exported bales were taken into account, 1.12 million tons of PET flake were produced. 440,000 tons were used to produce fibers, 283,000 tons to produce more bottles, 278,000 tons to produce APET sheets, 102,000 tons for strapping tape and 18,000 tons for miscellaneous applications. In 2012, 81% of the PET bottles sold in Switzerland were recycled.

BUSINESS STRENGTHS

- Point 1: Proliferation in the use of PET bottle on the back of 7 – 8 % CAGR growth coupled with low scale of recycling (about 30 – 40 %) to yield abundant feed stocks to be recycled.
- Point 2: Indian Man Made Fiber (MMF): Natural fiber ratio of 41:59 to align to global ratio of 63:37 consumption. Huge scope of growth in consumption of polyester fiber.
- Point 3: Raw material price for recycled PSF insulated unlike in virgin PSF which is linked to crude prices (PTA and MEG) thereby ensuring stable margins with scale up of business.
- Point 4: Changing life styles and cost effectiveness led to innovative applications of the MMF. This has clearly helped to expand its market share. Such trend is likely to continue. Some of the notable ones are winter clothes, Disposables, Non-woven, technical textiles etc. Expanding market lends growth visibility
- Point 5: Govt. support in terms of Excise Duty exemption for recycled PSF.
- Point 6: Industry associations like CII, have launched programs to reward companies for green endeavor like recycling. In future, government shall extend benefits to such companies.

Recycling Facts

- 10 plastic bottles = 1 pound of polyester fiber
- 1 ton (2000) lbs of plastic bottles recycled saves 3.8 barrels of oil
- 1 million plastic bottles recycled saves 250 barrels of oil
- 1 million plastic bottles recycled eliminates 180 metric tons of CO₂ emissions from being released into the atmosphere
- 10% of all US oil consumed (2 million barrels per day) is used to make plastics
- Recycling plastic bottles takes 8 times less energy than to produce an equivalent amount of new ones
- 150 fleece garments made from recycled plastic bottles save 1 barrel of oil
- 500 t-shirts made from recycled plastic bottles saves 1 barrel of oil
- 50 back packs made from recycled plastic bottles saves 1 barrel of oil
- Supplying the plastic bottles that Americans consume each year requires 47 million barrels of oil and releases 1.0 billion pounds of CO₂ into the atmosphere.

Successful Yarn Applications

- Colored recycled fiber blends producing economical colorfast yarns
- Integrating recycled fibers in the yarn center to create a core filler
- Matching a recycled fiber percentage within a high value, yet economical performance blend
- Optimizing a higher valued recycled fiber percentage in a commodity-driven yarn to enhance product value without significant price disruptions.

IV. CONCLUSION:

The savings made by utilizing low-cost raw materials for recycled products are usually completely eaten up by complex collection and preparation processes. Landfill: an estimated eight plastic drink bottles are kept out of landfill for each metre of polar fleece made from 80% recycled PET bottles. Fossil fuels: virgin polyester is derived from petroleum, so it saves on fossil fuels.

Nevertheless, recycling can still generate attractive profits, as customers are increasingly willing to pay higher prices for sustainable and environmentally-friendly products. The growing interest in ecological yarns has been driving the creation of new and highly-respected certificates. To be issued these coveted labels, manufacturers must provide evidence of sustainable production for 100 percent of their recycled material. For this reason, ever more companies are demanding energy-saving machines for manufacturing high-end recycled yarns. The heritage and craftsmen ship of traditional ikat weaving are still persistent.

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