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RESEARCH PAPER

Investigation on the Status Quo of Traditional Printing and Dyeing Technology in Lahore, Pakistan

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ABSTRACT

Based on the real data, this paper investigates the traditional printing and dyeing process in the streets of Lahore, Pakistan from the perspective of time and space. On this basis, the paper analyzes the loopholes in the field investigation of individual printing and dyeing process, and finally puts forward the way and significance of sustainable development of traditional printing and dyeing process. For this research study the appropriate method for the research is the field work which is done by the researcher in Lahore by visiting different sites where practical dyeing was being done. Along with the practical field work historical analysis has been done to trace out the historical patterns of the dyeing in Lahore and adjacent places. It is highly recommended that the dyeing methods to be renewed according to the demands of the people. There is a great difference within the development of the major patterns of the dyeing in the world but Lahore and Pakistan have its own uniqueness in this pattern.

KEYWORDS Field Work, Pakistan, Sustainable Development, Traditional Printing and Dyeing

Introduction

Ever since primitive people had the ability to create, they have been trying to add color to the world around them. They decorated themselves with natural colors, such as animal skins, bird feathers, sea shells, etc., adding a lot of color to their lives and depicting their stories on the walls of ancient caves. According to documents, primitive people used ochre pigments in cave paintings more than 15,000 years ago. With the development of fixed settlements and agriculture, around 7000-2000 BC, humans began to produce and use textiles, which also added color to textiles. The colored fabrics found in Egyptian tombs are textiles dyed before 2500 BC, dyed with a variety of pigments for different purposes, both aesthetic and practical. Although scientists have not yet been able to pinpoint a specific time when the addition of color to fibers was first put into practice, dye analysis of textile fragments unearthed at archaeological sites in Denmark suggests that blue dye indigo was used to dye fibers in the first century AD, along with an unidentified red dye (Ingamells, 1993). The earliest staining of flax fibers dates back to 34,000 BC and was found in a prehistoric cave in the Republic of Georgia (Balter, 2009). More evidence of textile dyeing dates back to the Neolithic period, to the large Neolithic settlement of Chatahoyuk in southern Anatolia, where traces of a red dye were found, possibly from ochre, an iron oxide pigment extracted from clay (Barber, 1992). In China, dyeing with plants, bark and insects has been going on for more than 5,000 years (Goodwin, ,1982). Dyes were used as early as 3000 BC, and China had a dyeing industry as early as 3000 BC. Meanwhile, Egypt had developed very good dyeing techniques, and the Egyptians promoted the Chinese and Japanese skills in dyeing textiles with primary colors and natural pigments. The early evidence of dyeing in Pakistan comes from Sindh province, which reproduces the inheritance of textile skills and wisdom of ancestors in Mohjo-Daro period 3000 BC, and the preservation of traditional printing and dyeing art

is of great archaeological value. On the basis of field investigation, through consulting relevant literature. The author carried out a field investigation on the path of inheritance and modernization transformation of traditional printing and dyeing techniques of intangible cultural heritage in the streets of Lahore, Pakistan. Next, through the literature review, let us make a historical combing of the traditional printing and dyeing process from the discovery and development of dyes and fibers.

Literature Review

South Asian modern textiles have a long history. They are interconnected by a convoluted history of international trade and rooted in tradition. The shared history of the modern nation states of Britain, Pakistan, Bangladesh, and India continues to shape new forms of cultural expression, and this chapter examines and regrounds the background of "remaking tradition". To get unique insights into the textile material culture of the Indian subcontinent, it examines a collection of historical catalogs titled The Collections of the Textile Manufactures of India. Pakistani art's history has undergone numerous changes. In addition to relating to visual traditions in light of postmodernism and attempting to support their position in the current, it internalizes the larger rhetoric of colonialism, nationalism, and international modernism. (Ata-Ullah, Bilal, & Ismail, 2020). Another work on dyeing technology presents that South Asian modern textiles have a long history. They are interconnected by a convoluted history of international trade and rooted in tradition. The shared history of the modern nation states of Britain, Pakistan, Bangladesh, and India continues to shape new forms of cultural expression, and this chapter examines and reground the background of "remaking tradition". To get unique insights into the textile material culture of the Indian subcontinent, it examines a collection of historical catalogs titled The Collections of the Textile Manufactures of India. Pakistani art's history has undergone numerous changes. In addition to relating to visual traditions in light of postmodernism and attempting to support their position in the current, it internalizes the larger rhetoric of colonialism, nationalism, and international modernism (Al & Hassabo, 2021).

Research Status of Traditional Printing and Dyeing Technology

Research status of traditional printing and dyeing technology abroad

In terms of the order of cutting, sewing and dyeing, in today's rapid development of fashion rhythm, shortening the time of clothing to market is more and more attention by manufacturers, clothing to be dyed before the market, in order to reduce the negative impact of the dyeing process on the appearance of clothing and sewing-related problems, generally speaking, clothes are dyed before cutting and sewing. Considering the characteristics of long delivery time and low prediction accuracy, for seasonal fashion colors, if the clothes are post-dyed, it may be closer to the actual market demand. From the perspective of the difference between the dyeing of clothing and the dyeing of fabric, although there is almost no difference in the dyeing procedure, the choice of dyeing of clothing needs to consider more aspects than the dyeing of fabric, and the choice of dyeing dyes of fabric is much simpler than that of dyeing of clothing. Reactive dyes are attractive in cotton fabric dyeing, which is similar to fabric dyeing. In the process of dyeing the fabric, the use of sulfur-containing dyes to dye cotton fabrics needs to take more precautions to avoid damage to the clothing, once there are impurities, such as iron up to 20ppm will not only affect the yield, but also have an adverse effect on the copper button. According to the principle of cationic pretreatment to give the pigment substance, so as to overcome the substance of the pigment itself, exhaust dyeing of materials after cationic pretreatment, the general process of exhaust dyeing of clothing with pigments includes pre-washing - pretreatment - exhaust dyeing - stone washing (optional)- fixed - heat treatment. Once the garment is ready, a chemical agent needs to be used to enhance

the stability of the pigment. For example, a cationic charge is applied to cotton cloth or clothing. The pigment can be used together with an antifoam agent and an anionic dispersant to enhance the stability of the pigment. Under the action of catalyst, the fabric was cured at 120-130°Cfor 20 minutes, and the fabric was dyed according to the color difference of the edge by using clustering technology and chroma separation method.

Research status of traditional printing and dyeing technology in China

From the perspective of traditional manual printing and dyeing aesthetic skills, scholar Qin Jie not only excavates the value of traditional manual printing and dyeing process from three aspects, but also expands people's aesthetic way of traditional printing and dyeing process. First of all, the value of traditional manual printing and dyeing technology is expressed in the exquisite skills of material, processing technology and presentation skills. Secondly, the beauty of the decorative effect is everywhere. Finally, printing and dyeing technology has various forms and rich meanings. From the perspective of inheriting and carrying forward the advantages of traditional manual technology on the basis of developing modern printing and dyeing technology, and organically combining the two, scholar Li Jing believes that backward production mode has become the root cause of the decline of traditional printing and dyeing technology. However, traditional printing and dyeing technology attracts people because of its green environmental protection characteristics and unique aesthetic advantages. Only by combining the traditional printing and dyeing technology with the modern printing and dyeing technology can the printing and dyeing technology level be fully developed. In the perspective of rural revitalization, explore the path of traditional craft brand construction. In the article "Research on the Path of Traditional craft Brand Building in Poor Areas under the Context of Rural Culture Revitalization - A Case study of traditional Printing and Dyeing technology in Western Hunan", scholar Xiao Hong proposed that "the implementation of the revitalization plan of Chinese traditional craft should start with the training of traditional craft skills of intangible cultural heritage to help rural people master a craft or technology." From the perspective of transmission channels of intangible cultural heritage, scholars Xue Ke and Long Jingyi proposed that the protection of intangible cultural heritage faces various challenges when digitalization brings changes to all walks of life, and the protection of intangible cultural heritage should give full play to the advantages of digital communication.

Investigation of Traditional Printing and Dyeing Process

Survey of traditional printing and dyeing operation mode in Lahore city

The textile industry is considered to be the economic backbone of Pakistan as it is the most important industrial sector in terms of exports and labor employment in Pakistan. Textiles and their manufactured goods account for more than 65% of Pakistan's total exports, amounting to $12.5 billion between 2001 and 2012.

At present, there are about 700 textile processing units in Pakistan, with complete sets of equipment for all production processes such as bleaching, mercerizing, dyeing, calendaring and printing. Imports of various dyes and pigments from Pakistan increased from Rs 129 crore in 2009-2010 to Rs 134 crore in 2011-2012. Table1 shows imports of dyes and pigments from Pakistan.

Table 1
Imports of dyes and pigments from Pakistan

Dyes	2011-2012		2010-2011		2009-2010	
	Quantity	value	quantity	value	quantity	value
Dispersible dye	6,849	1,318	7,196	1,224	5,111	1,014

Acid dye premetallization	3,143	978	3,365	1,080	1,971	839
Basic dye	1,272	425	1,451	468	1,559	526
Direct dye	1,145	206	1,144	194	1,096	181
VAT dye indigo	3,408	1,912	2,783	1,721	4,345	1,865
Other VAT dyes	420	622	443	589	545	714
Active dye	11,480	4,757	14,256	5,036	11,345	11,345
Pigment preparation	3,707	2,272	3,805	2,227	4,083	2142
Sulphur dye	4,135	721	4,451	717	4,065	873
Other synthetic dyes	437	165	451	183	183	195
Totally	35,996	13,376	39,345	13,439	34,567	12,924

Quantity: Ton, Value: Rupees, in millions
Source Federal Bureau of Statistics of Pakistan

As a printing and dyeing technology, traditional printing and dyeing technology has become an important component to drive the economic development of Lahore, Pakistan. The author learned from the interview with M. Asad of Baba Square in Lahore Free Market that there are more than 35,000 traditional printing and dyeing shops in Lahore. Since ancient times, people have basically adopted the operation mode of small family workshops. M. Asad's own store was founded 12 years ago. Counting my 5 employees in the store, the daily sales amount is between 15,000-20,000 rupees (675-900 yuan), and the monthly sales amount is between 200,000-250,000 rupees (9,009-11,261 yuan). Sales depend on the specific market conditions. They adopt the same printing and dyeing process for a variety of fabrics, and have become familiar with this traditional process. They believe that it is simple to operate, does not require large-scale employee participation, and reduces costs, so they do not need to make technical improvements. Once more advanced technologies are put into the market, this small-scale business model will be threatened, and many people will lose their jobs. This is not good for them, but will increase the sense of crisis in life. More importantly, the traditional dye technology is still favored by some customers. When the author asked whether different fabrics differ in color selection and training costs for employees, M. Asad replied: Yes, the printing process is the same but different cloth colors are selected differently (maybe two or three colors are mixed or multiple at the same time or some special dyed part of the cloth has some different colors to give them some special shade or some special color, etc.). We train a new employee, and the time it takes him can be learned in a month, or in a year, depending on a person's ability. Trainers train workers as they work and students how to dye cloth as they work. They do not charge the trainee for the training and even the trainer will give the trainee an allowance per day (it could be Rs 100, Rs 200, Rs 500 or Rs 1000 depending on the trainee's daily work). I've been in the printing and dyeing business for over 22 years, it's my family business, that's why I started it in the first place, before I started this shop, my brothers were in the business, I could learn from them, and then I started my own business, we are in this business to meet the needs of customers. The customer gives us their cloth as a sample, and we dye the cloth according to the sample provided by the customer. In addition, the house I set up as a printing workshop is rented, so I have to pay Rs 27,000 a month rent. We have five workers in the shop and beside me, there are four employees who earn Rs 20.000 a month. On top of that, we have to pay taxes to the government (J Park& J Shore, J.S.D.C., 1999).

Survey of traditional printing and dyeing materials in Lahore city

a) For the dyeing of textile fibers, the textile fibers are first dyed in dye solution or dye bath solution, and the coloring and absorption of the fabric become an important

determinant of dyeing. Secondly, dyeing, the process of coloring must be relatively durable and not easy to wash away the color by washing or normal washing procedures. In addition, the color does not fade quickly in the light. Finally, absorption, the process of dye molecules attaching to the fiber is the process of absorption, that is, the dye molecules are concentrated on the surface of the fiber. There are four forces by which the dye molecules adhere to the fibers: Ionic force, Hydrogen bond, The van der Waals Force, Covalent bond.

b) Wool dyeing, wool is a complex protein containing more than 20 different amino acids, in the dyeing process, the sulfuric acid added to the dye tank and the amino group of the protein to form an ionic bond, in the dyeing process, sulfate anion (negative ion) is replaced by the dye anion. In the dyeing of wool, silk, and synthetic fibers, there may be hydrogen bonds between azo, amino, alkyl, and other groups and co-nh groups on the amino groups. Under alkaline conditions, the fiber reactive dye molecules (molecules containing chemically active centers) react chemically with the water-oxygen groups of cotton fibers, thus forming covalent chemical chains in the dye pool.

c) For chemical dye dyeing, in the process of any dye dyeing operation, no matter what kind of chemical dye is used, it is necessary to provide heat to the dye solution, energy is used to transfer the dye molecules from the solution to the fiber, and to expand the fiber to make it more absorbable.

Dyeing uniformity, also known as evenness, is an important measure of the dyeing uniformity of various natural and synthetic fibers. Through the control of dyeing conditions, the purpose of controlling uniformity can be achieved. Mixing is done to ensure proper contact between the dye and the substance being dyed, and the staining rate is controlled by the use of inhibitors. Solvent dyeing is a dyeing method that has been seriously considered in recent years, in which water as a medium is replaced by solvents, such as chlorinated hydrocarbons used in dry cleaning. The technical advantages of solvent dyeing are: Rapid wetting of textiles, reduce swelling, Increase the dyeing speed of each specific amount of material, Energy is saved because less heat is required to heat or evaporate vinyl chloride. As a result, it eliminates the wastewater pollution problems associated with traditional printing and dyeing methods.

In the study of the dyeing process of textile articles, the author conducted a detailed interview with the Abdul-Rahman vendor in Baba Square of the Free Market in Lahore, Pakistan. The contents are as follows: First, we look at what kind of fabric the fabric is, and then we decide what color to dye the fabric, because usually there are two dyes, plant and chemical. In the dyeing process, considering the durability of the color on the fabric, we usually do not choose vegetable dyes. The other is chemical dyes, and we always use good quality chemical dyes to get meaningful results. Chemical dyes are also permanent colors. After dyeing the cloth, we do not have any problems, the color we dyed will not fade or leave the color of the cloth like the vegetable dye. We use different types of chemical dyes for different types of clothing, we have many types of chemical dyes, in which we use two types of chemical material colors. The one is Pure chemical material color, pure chemical color is mainly used in fireworks, is made of metal salt. Metal salts are often used in fireworks. By using this pure chemical dye, we can dye many types of colors in a very short time, and after doing a little bit of effort, we can dye the cloth in the color we need, we have to get our chemicals. By dyeing with this pure chemical dye, we can dye organza, chiffon, silk, and even all types of pure clothing. This pure chemical color can dye most clothes, but if we can't use nylon or polyester with this color, then we use other chemical dyes. The second is Nylon or polyester color, nylon or polyester color is also used in fireworks, we can get this color from metal salts. By using nylon or polyester colors, we can dye various types of clothing to get the best results, using some chemical colors on different types of clothing. Pure organza → we only dye with solid colors, Indian fabrics → we also dye with solid colors, high-grade polyester → It cannot be dyed with

any one color, so we cannot dye this high-grade polyester. The specific dyeing process is like this: First we put some water in a steel bucket and add some dye to dye the cloth, and then we put a steel pot next to this steel bucket with an appropriate amount of water, and the pot is constantly heated. We wait until the water in the bucket starts to boil, and then we put a cloth into the boiling water in the bucket, and we can also shake this cloth during the dyeing process until we get the desired color. When we think the color matches, we have to put it in the air to dry. For dyeing some special or some traditional clothes, we can repeat the dyeing process with different types of colors, or we can also dye different colors at the same time to get different results. But it often determines what type of fabric that piece is, repeating the dyeing process with different colors. The advantage of this dyeing process is that it is easy to dye various clothes in different colors, styles and types through this simple dyeing process. By using this process, we don't need any special technology or some special type of machine to perform this process, we can easily turn this process into a very simple operation that takes the least amount of time and effort. This process can be carried out anywhere, it does not require a large number of workers to do this, even one person can complete this simple and easy to operate process of dyeing. In the process of chemical materials being used to dye clothes, if we do not dispose of the residues in a proper way, it will do harm to our environment. Therefore, in solving the problem of residual pigments, we must pay attention to the proper disposal of this chemical substance, so that it will not pollute the normal living environment of humans. The printing price and profit of each piece of fabric is different. Prices are roughly as follows: Plane Dupattah 2.5gz（meter）－150Rs.

Bnarsi Dupattah 2.5gz（meter）－250Rs.

Bnarsi Dupattah 5.0gz（meter）－350Rs.

Plane Dupattah 5.0gz（meter）－300Rs.

Embroidery Dupattah 2.5gz（meter）－300Rs.

Bnarsi fancy Dupattah 2.5gz（meter）－varies with the cloth maybe (500,1000or120Rs. ect) (9)

Survey of traditional printing and dyeing techniques in Lahore city

According to the author's investigation, there are various printing and dyeing techniques. It can be summarized in the following aspects: Tie-dye, Immersion dye, Spray dye,Transition dye, Cold dye, High white dye, Washable dye, Reverse dye, Top dyeing.

However, in Lahore's Free market Baba Square, tie-dyeing, dip-dyeing and spraying processes are common.

Tie-dyeing is the process of dyeing fabric or clothing that is made from knitted or woven fabric, usually using bright colors to stain cotton. Tie-dye is a popular printing and dyeing technique used to create colorful designs and clothing patterns. For more than 6,000 years, people have used a variety of techniques to tie dye clothes. Today, using non-fading dyes and creative folding techniques, tie-dye is a great way to make plain T-shirts and other clothing bright and flamboyant, and as part of the hippie style, tie-dye became popular in the late 1960s and early 1970s, it was popularized in the United States by musicians such as John Sebastian and Janis Joplin. Tie-dye is the same as batik printing, but here, the dye is formed by tying knots on the fabric before being immersed in the dye bath. The outside of the knotted part is stained, but if the knotted part is firm, the inside is impermeable, which creates an effect of blurred or mottled features.

Tie-dye process flow chart

Shorts clothes→refine (Detergent -1-1.5% 70℃for 10 minutes)→Hydro-electric extractor (Remove excess water)→dryer (For drying clothing)→Tie-dye clothing (According to the requirements of each customer)→Dye (Put the clothes in the dye bath for 15 to 20 minutes)→Bathtub drainage→rinse (2 times)→dehydrator (Remove excess water)→Tie-dye opening→dryer (Dry clothing)→fixation (1-2gm/l)

Note: There is no way to rework or rematch during the tie-dye process

It is best to dye the sleeves and bottoms separately, roll up the undyed part with a plastic bag, and secure it with a rubber band. Dye, rinse, and dry between dips, placing the intended wash in a set synthetic naphthol detergent. This concentrated, PH balanced detergent prevents dye from flowing to undyed parts of the fabric.

Dye process flow chart

Shorts clothes→refine（abluent-1-1.5% 70℃ 10 minutes）→Hydro-electric extractor（Remove excess water）→dryer（For drying clothing）→Clothing in dry/wet condition→Binder coating1-1.5gm/l（Oxygenating agent2-2.5gm/l）→Dip the sample into the dye bath（By shadow）→Place the garment in a dye bath and shake until it becomes the desired color→Swing 15-20 times in 10-15 minutes→Hang the garment on the dye bath（5-6hours）→maintain（30-40 minutes at 80-90 °C）

Note: Clothes will be lighter if they dry a little. The top of the band is gradually shallower than the bottom. In dip dyeing, the front and back of the garment are dyed, while in spray dyeing, only one side is dyed.

Spray is a dyeing method that can produce a white effect in specific areas of clothing, all types of textile clothing are suitable for spray dyeing, it is also known as pigment spray.

Spray process flow chart

Shorts clothes→Enzyme administration(The enzyme was administered at 1.5gm/l 55℃ for 50 minutes)→dryer（Dry clothes at 70-80 °C）→Dummy costume→Spray the solution onto the clothes→Knitting curing（Cure at 120℃for 30-40 minutes）→Woven curing（Cure at 130-150 for 30-35 minutes）→Adhesive for color fixing→Softener/silicone resin

Note: In spray dyeing, the color effect can only be seen on the front of the garment. The back of the dress is not colored. Pigment dyes are suitable for spray dyeing.

Conclusion

Lahore's traditional printing and dyeing process has begun to transform into modern industry and can no longer meet the needs of modern people, but its cultural and historical value still exists objectively, and people have realized the necessity of preserving and inheriting it, because everything has its own development and evolution laws. Therefore, today's handicrafts, including traditional printing and dyeing processes, serve as a supplement to meet social needs and people's economic life. Crafts are becoming more important in terms of cultural value. Compared with industrial civilization and traditional handicraft, they have their own characteristics and laws with their own values. Nowadays, there is an obvious trend of combining traditional handicrafts with industrial civilization. The combination of these two methods is also one

of the effective ways to fully grasp the unity of the world. Traditional handicrafts can not only express the meaning of human emotions and ideals, but also contain feelings and cultural values that are gradually being lost in today's world. Moreover, traditional handicraft is an effective way for people to get physical exercise, improve the employment rate, reduce urban pollution, and inherit the city's history and culture. Environmental pollution has become a global problem, how to combine industrial development and traditional technology to achieve the unification of urban and rural areas, to create a harmonious situation between human and nature, social development has become a major thinking we face.

From the perspective of sustainable development, we must set long-term goals, taking into account the need to cultivate traditional handicrafts and encourage the transmission of traditional handicrafts. Government departments can provide certain economic support for traditional craftsmen through the setting of jobs. Adjusting economic relations between regions or sectors for sustainable development; The second is to change the quality of products, sustainable development contains many aspects of the connotation, reduce the development of wealth expenditure, reduce raw materials, reduce energy consumption, reduce environmental improvement costs, make resources more reasonable distribution, income balance. Reduce the degree of environmental pollution, such as supporting the cultivation of vegetable dyes and the corresponding popularization measures (C L Bird, J.S.D.C., 1945); The third is to improve the cognitive ability of craftsmen to inherit traditional handicraft technology and cultivate their interest, emphasizing the sustainable development in the process of inheritance, and the lagging concept hinders development. The fourth is to ensure that the team should be stable and the technical level should be continuously improved. The fifth is to continuously develop and protect the resource base, which is not the task of any kind of industry, but the concept that all walks of life should have. Sixth, in the process of development, the environment and the economy should be organically integrated, keeping in mind the concept of sustainable development.

To sum up, it is necessary to protect and prevent the loss of traditional handicraft technology to improve the attention of relevant departments and encourage people from all walks of life to participate in the attention of traditional handicrafts.

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