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Academic Article

Analysis of The Process of Indigo Dyeing Products

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Abstract

This article is part of a research on the comparison of indigo products from Thailand, China and Japan. The researcher has studied the theoretical concepts used in conducting the research, including local knowledge, participation within and outside the community, and inherit knowledge and creating new technicians. One of the research processes is the production process as one of the objectives for data analysis and synthesis.

The study found that indigo is a wisdom that has been around for more than 2000 years by bringing in local plants that give indigo such as indigo tree, boeng tree and hom. The process of producing indigo dye products can be divided as follows;

The manufacturing process for indigo-dyed products in Thailand consists of indigo tree, indigo material, fibers, and ready-to-wear fabrics. Manufacturing methods 1) Preparing indigo 2) Preparing lye and acid (indigo feeding) 3) Indigo dyeing by production process. Indigo-dyed products in Thailand, China and Japan are different due to many factors causing differences in quality, style and of products. The production process is complicated with the use of similar raw materials. But with the environment, soil, sky and air, as well as some types of raw materials are different and each area pays attention to the details of different steps, for example, China places emphasis on the re-dyeing process and the use of red comes into the mix to achieve intensity. Thailand attaches great importance to the process of making the alkaline water that is mixed with the raw materials very much. Due to the inability to control the production process consistently, it therefore pays great attention to indigo feeding. Finally, Japan, with its climate change, cold, hot and sea breeze, therefore pays attention to the raw material that is indigo. Due to the cold climate, it chooses to use dried indigo as the raw material for the production of Japanese indigo dyes.

Keywords: Production Process, Indigo, Indigo Dye Products, Thailand, China, Japan

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Introduction

In human society from the past to the present, there are many factors that are necessary to live for survival. Can be peaceful, such as water, food, drinks, medicine, including residences and clothing for dressing in various ways. All of these are called 4 factors that humans need to use in Living as well as the development of all 4 factors to be diverse and meet the needs of humans that are necessary to live in a variety of different forms in each area (Prayanavarodom, 1990, p.19) saying that the 4 factors used to live with food, clothing, clothing Residential and medicine Every human being is necessary to use these things to start life, especially the matter of living, food including clothing and medicine to treat the world in their lives. It can be said that 4 factors are important to human life, clothing, clothing, is one of the 4 factors that are important to humans due to the weather in each area that is different, making the context of the production of products in the form of clothing or belongings, appliances are different in each locality. The production of rice appliances is called folk handicrafts. Fabric handicrafts or clothing is a human wisdom used in life as (Leesuwan, 2013), said that folk arts and crafts are the development of human equipment. Creative handicrafts that are used to refine more and more appropriately. Folk arts and crafts are a mirror culture reflecting the idea of creating materials, materials used in the form of folk handicrafts, demonstrating the nature of the condition of life in each locality from the past. Every household is produced in clothing or weaving in every household. Therefore, the production of clothing is very important in the urban and community society, with beliefs, traditions or steps to calculate the production, with different steps in each locality, including the raw materials used is different as well.

The handicraft process of indigo-dyed fabric products has been around since the past. Indigo-dyed fabric is the product that is produced in the first place in the world and is very popular in Asia because it is a local wisdom that occurs in the environment in Asia because it is a country of agriculture. And it is a local plant called “Indigo” that can grow. It can be said that every household produces and gives a lot of indigo fabric because it is a local plant in mostly Asian countries. In Thailand, the production of indigo-dyed products is a wisdom in the Northeast and the North of the country, which is a wisdom that has been passed down for a long time in every household. Inevitably, the production of indigo-dyed products is made for use in daily life. With the changes in the present world that have occurred, the production of indigo-dyed products in Thailand has changed by using a large number of machines causing indigo dye products and production processes not to be developed further and visible (Saithong, 2007). Most of the raw materials used to produce indigo dye products are developed according to each local formula. They are usually plants that can be found near households, such as indigo leaves, mangosteen bark, turmeric, yarrow, Malabar leaves, etc.

Indigo-dyed products are hand-woven fabrics that are gaining a lot of popularity today due to their outstanding beauty and value in both beauty and art. It is beautiful, has an environmentally friendly production process that is the mainstream of the world today. Compared to the production of synthetic dyes in large industrial systems can cause pollution to the world and the environment, accelerating the rate of global warming to increase. (Indigo Center, Sakon Nakhon Rajabhat University, 2017). At present, there is a mainstream trend in conservation and protection of the environment, causing natural products or the production process of natural products to become popular again, especially the production. Products in indigo-dyed fabrics, which are products from the community using natural raw materials, which have an environmentally friendly process and are valuable because the production process of indigo-dyed products is complex, difficult to do, and has a mystical culture, beliefs and formulas are specific to each locality. In terms of the indigo fermentation process or the production process, it is a process suitable for studying and delivering the value of preservation as it is a local wisdom that has been passed down from generation to generation.

From the background and importance above. Therefore, the researcher would like to study, analyze and compare the production of indigo in each area, namely Thailand, China and Japan for the benefit of education at the higher education level, especially in the area of textile and fashion design and the development of indigo dye products community industry in Thailand.

Objective

To study the production process of indigo dyeing products in different components in each area, both Thailand, China and Japan to do research at the Doctor of research.

Research Methods

This study used a qualitative research methodology together with a research methodology in fine arts. The research model was:-

1) Study from relevant documents consisting of research, books, textbooks, academic articles.

2) The interview was conducted as a method for collecting data and evidence, using dialogue and dialogue with the aim of obtaining information that meets the objectives of the research. The informants were divided into 3 groups:

2.1) Indigo dye community group in Sakon Nakhon Province, Thailand from 3 famous production sites by using random purposive criterion.

2.2) Indigo dye community group, Guizhou Province, China in Danzhai Wanda Village from 3 well-known production sites by random purposive criterion.

2.3 A group of indigo-dyeing communities in Tokushima prefecture, Japan, in the Kamita area from 3 famous production sites using a purposive random criterion.

3) Participatory observation in the process of operating within the community.

Conceptual framework in education

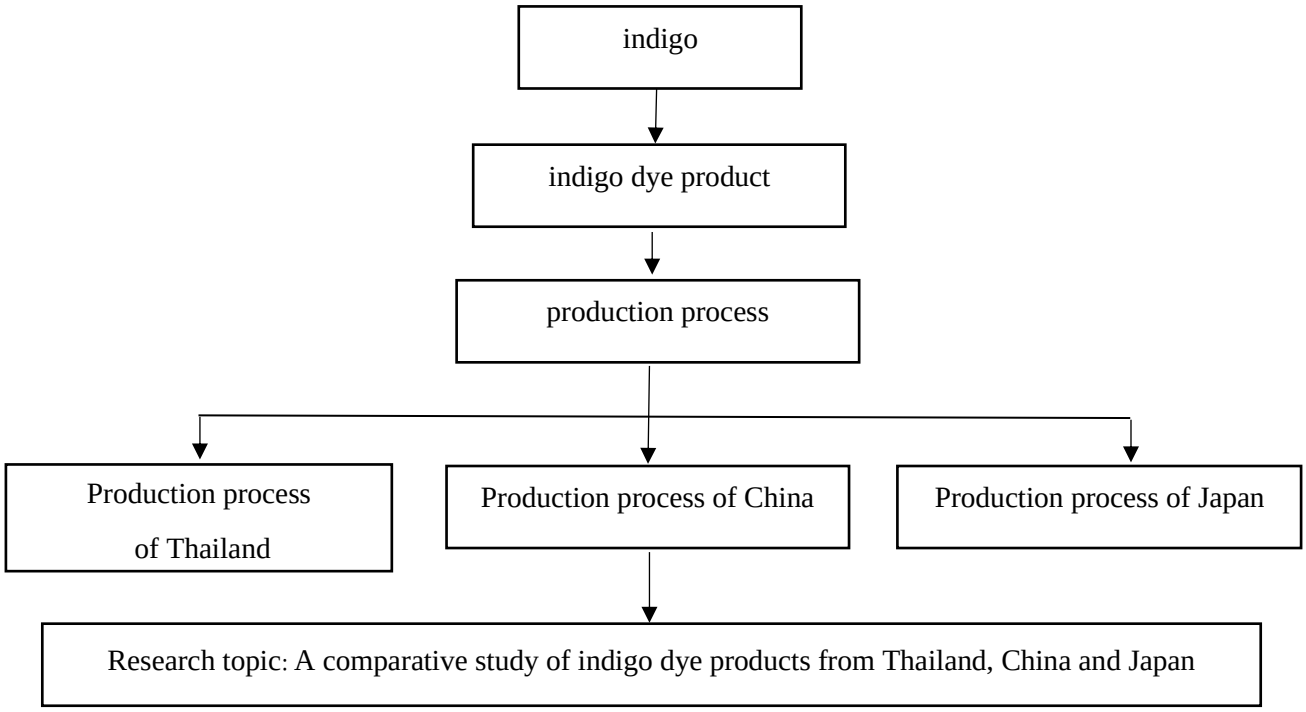


Figure 1 Conceptual framework for studying and analysis of production Indigo dyeing products in Thailand, China and Japan source: Author, 2023

In this research, the researcher has studied the data, relevant theoretical concepts for the study of indigo dye production processes of Thailand, China, and Japan from documents and academic works by studying both theoretical concepts, research methods, and production processes of indigo-dyed products in each of the following areas;

Indigo dye product

Indigo is a wisdom that has been around for more than 2000 years. Humans have begun to know how to make indigo from nature by bringing local plants that give indigo, such as indigo trees, boeng trees and Hom, which have a shape and appearance in each place and locality varies according to the region. Many people may misunderstand that the indigo tree and the hom tree used to make indigo are the same tree, but actually they are different species but belong to the same species family. Hom looks like the color is indigo as

well. (Indigo Center, Sakon Nakhon Rajabhat University, 2017). Indigo is classified as a legume. It is a small shrub plant that can branch a lot when branching, but the height of the plant is about 4-6 feet or about 1- 2 meters. Indigo leaves are shaped like fishbones but are smaller. The leaves are prepared to form alternate feathers. The leaves are usually elliptical or elliptical in shape with a rounded tip. The indigo flower is a bouquet in the axils of the Brahmin's embroidered leaves. It looks like a small round pod, similar to a pea pod. Inside the pod, there are small cream-colored seeds filled with yellow. Indigo harvesting and planting has 2 periods: the rainy season and the dry season. At the age of 3-4 months, it can be harvested.

"In addition to the benefits of indigo used as a medicine, indigo can also be used in a variety of ways, especially in dyeing fabrics and clothing because of its beautiful colors suitable for dyeing fabrics, it is said that indigo. It's the king of fabric dyes. Fabrics dyed with indigo tend to have properties that can help protect the skin from the sun, which is supported by a lot of research"

Indigo dyed with globalization. Currently, there has been a change of restoration by bringing indigo dyeing fabrics in various places that are open for people to buy, such as one tambon, one product of the shop in various provinces, including district fairs and OTOP trade fairs nationally and internationally, by selling them in groups that support both district and provincial levels until the indigo fabric is known again. Later, products from indigo fabric began to enter a variety of markets, making it more targeted and more interested in the general public, as well as being processed in the form of various products such as scarves, shawls, fashion clothes, ready-made fabrics, bedding or even furniture, home decorations, these products are designed according to the needs of today's consumers with various needs, causing the value and meaning of the indigo fabric to change from a community product to an economic product.

Production process for indigo-dyed products

"Yupinsri Saithong has mentioned in the history of dyeing that dyeing on fabric has been done in almost every part of the world. In ancient Asia, it spread from central India to Malaysia and across Africa. Weaving, which has existed since ancient times, was not only excavated in ancient China but also came from the ancient caravans. There is evidence that tie-dyeing originated in the early Tang Dynasty of China around the year 618-906, after which it spread to Japan. Once cotton and cotton were known for hundreds of years. Later, in the 19th century, ordinary people were able to produce tie-dyed cotton as a household industry because the industry became more important." (Saithong, 2021, p.12).

In other words, the beauty of blue and white. Indigo-dyed fabrics in traditional Chinese, Japanese or even Thai styles are dyed in a special way with white as a separator. Natural indigo dyeing has a long history. During the Qin and Han dynasties of China (221-220 B.C.), indigo-dyed fabric has been used as the main material for making clothes for at least 1,000 years. Indigo dyeing is very popular in many countries, but which is clearly seen in Asia, can be called multiculturalism together. Fabrics dyed with these plants often have a faint aroma and are naturally moth-repelling, a special property of indigo dyeing. Indigo dyeing can be used to show a wide range of techniques. It is strange that indigo dyeing and dyeing methods have been so elaborately thought out for a long time. The process of producing indigo-dyed fabric is different from region to region, giving it a different identity, but it is a technique that most people think is an easy way to make fabric patterns but instead is a complicated way and complicated. In the beliefs of Asians, young women who are capable of weaving, tie-dyeing, or fabric-making are considered to be the elite women of the community. In addition, the indigo fabric has the same property to prevent insects and sunlight in all areas. with indigo fabric production.

Manufacturing process of indigo dyed products in Thailand

Production process raw material

Processes and raw materials used in production tend to change according to local and social conditions. But fundamentally the process steps are similar. The preparation process usually starts from planting the indigo plant when it grows up and when the time is right, it will be harvested and used to produce indigo water.

1. Indigo tree, Indigo tree is a small shrub that has quite a lot of branches with a height of about 4 to 6 feet with a green trunk propagated by seed. It is a type of tree that likes sunlight. resistant to hot weather Rain and saline soils grow better in sparse forests in the Northeastern region of Thailand, as well as growing

more abundantly in Asia due to hot and humid weather. As a result, the indigo tree can grow very well, commonly used for cultivation for use in making dyes.

2. Indigo material is obtained from soaking fresh indigo leaves and trees from indigo trees that are grown in most areas. It grows in almost hot and humid areas. Bring it through the fermentation process using various raw materials such as Acid and alkali to produce indigo used for dyeing.

3. Fibers are hand-maded cotton threads or factories. It is a 100% natural cotton thread made specifically for dyeing to give the fibers a good color look.

4. Finished woven fabric, but must be woven fabric made from 100 percent natural cotton to absorb the color well and be beautiful.

Production method

Preparation of indigo material Indigo plants that can be planted will harvest fresh indigo leaves and branches aged 3-4 months in the early morning, curled up in a font, sorted into a container almost full, covered with heavy objects. Add enough water to cover, soak for 10-12 hours, then turn the indigo leaves and soak for another 10-12 hours or soak for 18-24 hours. Separate the residue, add lime or red lime, set aside for 1 night, pour the clear water and leave to keep it as wet indigo and beat the indigo material until it becomes fluffy and set aside.



Figure 2 Indigo making and indigo forging
source: Author, 2022

Lye preparation, making alkaline water varies from area to area depending on the context of the community because the raw materials used to make ashes to make alkaline water are different from area to area. In some areas, banana trees will be completely dried until there is no moisture to be burned, and when the ashes are obtained, the ashes will be soaked in water and filtered to use the ashes to become alkaline water.



Figure 3 Ashes from dried banana trees
source: Author, 2022

Dye preparation pot, bring wet indigo material mixed with ashes and stir well 2-3 times in the morning and evening until the dye is greenish yellow or green, turbid, the bubbles are dark blue, shiny, looks inflated, not collapsed, it takes about 15 -20 days. The amount of alkaline water is 3 bowls per 3 ladle of indigo material. Then, add acid made from citrus fruits in the amount equal to 1 boiled egg.



Figure 4 Prepare indigo water and add tamarind paste to prepare lye water
source: Author, 2022

Indigo dyeing can be done in two ways:

1. Fiber dyeing Take the cotton fibers or the brewing fibers to wash with clean water, wring them out and dye them. Then washed with clean water, dried in the shade and then woven into the desired pattern.

2. Dyeing the whole piece, take a piece of undyed cotton, clean it with clean water or wring it out with water and wring it for a while and wring it out in the air until you get the desired intensity. Then rinse thoroughly with clean water and dry in the shade or in a well ventilated place.



Figure 5 dyed with indigo
source: Author, 2022



Figure 6 expose the dyed fabric to the air
source: Author, 2022

Manufacturing process of indigo dyed products in China

How to dye by ethnic groups in China

Bring plants that produce indigo, 2-3 inches in diameter, bring flowers that bloom in the seventh month, put the leaves of the indigo plant in a container that will be used to ferment or make an indigo pot, take the bark of the red oak wood to prepare and mix the paint. After that, mix the indigo fermented water with the ashes and mix them together, soak the fabric you want to dye for 30 minutes, then lift it out and wash it off and hang it to dry. After that, re-dye until the desired intensity is achieved, dry for 5-10 days, then soak the cloth in starch made from oil, soak the cloth in red oak wood. After that, it is the cloth to be washed with clean water and repeated 2-3 times until the indigo cloth has a red glow as desired. The color was determined by the fermentation time and drying time. From an interview, it took about half a month to dye, dyed 7-8 times, each time taking 4-5 days. Wait for dry 5-10 days. Step 2: Red dye for 15-20 minutes, rinse with water and wait to dry for 5-10 days, repeat 7-8 times (Di, 2022).

Indigo-dyed fabric in Chinese style is natural indigo-dyed fabric. There are 2 types of patterns. First is using a white pattern printed on a blue background. The second is the use of a blue pattern printed on a white background. The motifs on both sides of the fabric have developed in recent years, focusing on the themes of vegetation, mythical creatures and auspicious objects, as well as the characters of the story that express goodwill for life of the Chinese. Nantong indigo-dyed fabric from the Ming Dynasty 1368-1644 and the Qing Dynasty (1644-1911) (Chinese Culture, 2021). Indigo Dyeing. Online). Indigo dye is also used as a staple material for clothing, especially the tie-dye technique prevalent in southern China. A minority or ethnic minority in Guizhou Province is famous for indigo tie-dyeing (Yamazaki, 2008).The fabric is characterized by being dipped and dyed with indigo to achieve an indigo blue. This method makes the fabric attractive using a traditional technique in 3 steps: 1) Simple folding process (True plangi) is taking a piece of fabric, using ropes or rubber bands or tie them into a knot and dye them to create a pattern. 2) Pleating: folding and pleating a piece of image and dyeing it to create a pattern. 3) Color blocking, by using paste, that is, using paste-like glue to draw on a piece of cloth and then dye it to create a pattern.

Production process of indigo-dyed products in Japan

Indigo dyeing in Japan was active in Tokushima prefecture during the present Edo period. The reason why it was actively created during the Edo period is because common people were forbidden from being beautiful during the Edo period. Noble colors such as purple, crimson and plum did not work and indigo became more popular. The average person in Edo still has a desire to wear fashionable clothes even within the limits. So I made indigo-dyed items, which are luxury items that politicians don't see as luxury. It is said that foreigners visiting Japan, which opened in the Meiji period, praised the bright and deep indigo (blue) of indigo dyeing as the most beautiful indigo “Japan blue” is often dyed with natural materials such as silk, linen, and cotton, and it is said that indigo-dyed products have a deodorant and antiperspirant effect, and have insect and snake repellent effects. Not only clothes such as kimonos made of low-grade cotton and linen, but also various goods such as towels, hospitality, pajamas (kaimaki) *, and dyed scriptures (The page you are looking for cannot be found. (2021). Indigo dyeing in Japan. online)

How to dye Japanese indigo

Japanese people use “Mitsusa Aoi Mitsuzagi” for a very light indigo, “Nado Nando” for a slightly darker turquoise, and “Akiiro Kachiiro” for the darker color after “indigo” is a name that has been used and featured ever since, a dedicated indigo dyeing shop “Konya Koya” has opened in various locations to produce indigo-dyed fabric products. But in the early Showa period, artificial indigo dyeing technology was born. The time-consuming and labor-intensive indigo dyeing culture has declined. Indigo and indigo jeans are almost completely dyed with artificial indigo. (wa-gokoro, 2021)

How to make indigo dye that takes time and effort

It takes up to 4 to 5 months after harvesting (蓼藍)tateai to make the indigo dye with the following steps.

Step 1 Seeds are sown in spring and cut in early summer. Dry and slice about 1.5 cm thick.

Step 2 The leaves are sprinkled with water and piled up high and are placed in a building called a bed (nedoko) for about 3 months, sprinkling them with water while monitoring the day's weather and temperature.

Watch and stir together. Marinate and steam in hot air. Fermentation of Persicaria This tinctoria is called sukumo (蒅), using wooden barrels or clay jars.

Step 3 To make sukumo (蒅) dye, first add water, whitewash, flour, sugar, sake, ash to the indigo bowl buried in the ground and control the temperature at 30 degrees. Once the microorganisms start working and continue to ferment when it smells like compost, it is finished in about a week. In a traditional Konya dyeing facility, the temperature is controlled by arranging the indigo bottles containing the dye and setting a fire around them. In the Edo period, clams were ordered from Kuwana City, Mie prefecture, baked and ground into powder, and clam ash was used instead of limestone. Shell ash gives sukumo (蒅) softness and because it is moderately soluble in indigo dye, sukumo (蒅) lasts longer. Since it is a shell, it is gentle on human skin. Limestone, on the other hand, is insoluble in water and does not act as food for microorganisms, so the more it is added, the more it will remain in the dye, which will make the indigo plant insoluble in the dye. While stirring the limestone, it will harden the sukumo (蒅) and make it difficult to stir, and it is said that limestone is bad for the human body.

Step 4 When the fermentation is complete, bubbles will appear at the top indicating that it can be dyed. This condition is called “indigo blossom”, and the set of processes for making this dye is called “Aidate” and “ai o tata teru”. But in the final stage, it must be checked by eye, hand or smell, sometimes it must be tasted to check the alkalinity. It can be said that it takes the five senses to make sure that it is truly handmade. The finished sugumo (蒅) can be dyed as it was or can be hardened by using water to make “藍玉Aidama.” Making “藍玉 Aidama" can be stored and transported to distant places. The “藍玉 Aidama" produced in Tokushima is made by mixing sand from the NoNe Coast in Kochi prefecture, and it is said that the salt contained in the shore sand prevents spoilage. Therefore, in the Edo period, this “藍玉Aidama" was traded and used at dyeing shops in various places across the country. But at times, watering, turning, feeding, warming takes the same amount of time and effort required for indigo dyeing as for raising living creatures, and indigo dyeing is difficult to maintain a stable pH of the liquid so that it does not become acidic.

Dye method

Dip the natural thread or fabric in the dye solution at once. After that, squeeze the dyeing material dry and soak it in clean water to expose it to air. It is generally soaked in water, but it is also said that if soaked in soybean water, it causes a chemical reaction and is easy to dye. At first, it looks yellowish green, but when the indigo dye chemically reacts with oxygen, it turns blue as soon as it comes in contact with air. In addition, dyeing and repeated washing With over-dyeing (over-dyeing), the color is changed from light blue to deep indigo by sewing the areas you don't want to dye with thread and dipping them in the dye solution. The pattern left over from stitching remains white in the stitching area. It's called tie dye (Yamazaki, 2008).

Conclusion

Indigo dye products are products that have been with humans from the past to the present. It is a valuable procedure and is one of the four factors that human beings have developed and invented to meet their lifestyles. Indigo, or such dyed products, has many uses. Indigo-dyed products have been around for more than 2000 years. Humans know how to take advantage of work to create handicrafts, mostly fabrics. But in fact, indigo has a variety of benefits. It can be used in both roots and leaves with different properties such as saplings are mostly used to produce indigo-dyed fabric products. Meanwhile, some areas may be used as medicines for various symptoms or some areas are used indigo to perform various belief rituals. In addition, at present, indigo fabric is a trend of change and restoration of natural product production again due to awareness of global warming and is also a product that represents wisdom and local products at the national level as well. In each area, the production process for indigo dye products is different according to each area of residence or different cultures, thus making the indigo dye products in each area different and unique in each area. The living environment and culture determine the production of indigo products. It is said that indigo products have been made in almost every part of the world, especially in Asia where the word indigo originated because indigo plants are plants that can grow well. In Asian countries such as Thailand, China and Japan are large industries of indigo dye products today with different production processes with different techniques and procedures.

Thailand, China and Japan have similar indigo dye production cultures with their own unique processes due to the different living environments, terrains, climates, and cultural traditions are similarities, but there are differences according to the social context, causing the production process of indigo dyeing products in each country to have different methods according to the wisdom and techniques that have been passed down from generation to generation in each area It can be said that the indigenous people in the northeast of Thailand are the country's largest production of indigo dye products, processes and raw materials used in production. It will change according to the local and social conditions, but the basic steps are similar. The preparation process usually starts with indigo planting when it grows up and when the time is right to be harvested. and used to produce indigo water. Priority will be given to the equipment preparation process 1) indigo plant 2) indigo texture 3) silk or cotton thread 4) ready-made woven fabric. Indigo plants that can be planted will harvest fresh indigo leaves and branches aged 3-4 months in the early morning, roll them up into a font, arrange them in a container almost full of heavy objects, add water when it is flooded, soak for 10-12 hours, then turn the indigo leaves. and soak for another 10-12 hours or soak for 18-24 hours, separate the residue, add lime or red lime and set aside for 1 night. Making alkaline water is different for each area, divided according to the context of the community because the raw materials used to make ashes to make alkaline water are different in each area, some areas will use completely dried banana trees until there is no moisture to burn. And when the ashes are obtained, the ashes will be soaked in water and filtered to use the ashes to become alkaline water. This process is very important in Thailand because alkaline water will react with indigo and give different colors. Therefore, using plants or ashes from different plants to make alkaline water will be effective. Mix the wet indigo with joe ash 2-3 times every morning and evening until the dye becomes greenish-yellow or green, turbid, with dark blue bubbles, shiny, looks inflated, not collapsed, takes about 15 - 20 days, the amount of the ratio of 3 bowls of alkaline water per 3 ladle of indigo material, add acid made from citrus fruits. The dyeing process uses natural twine to soak in the prepared indigo water or it will be a finished picture to dye until the color is satisfied. And twisted to dry and just rely on the sun and will go into the next stage of product development. As for China, it is a well-known area for producing indigo dye products that have been around for more than 1000 years. There is a unique and complex production process that is different from other areas because the production of indigo dye products is a way of life for ethnic minorities in China in Yunnan, Guangxi, Guangzhou. It is the main culture, including the main wisdom of these people in China and is also an ethnic group that has expanded the immigration territory to the south and brought the wisdom of indigo dyeing down to Southeast Asia as well. The production process is complicated and takes a long time until the process is complete, as you want to bring plants that produce indigo, 2-3 inches of thorn branches, bring flowers that bloom in the 7th month, put the leaves of the indigo plant in a container to be used to ferment or make an indigo pot. Bring the bark of the red oak wood to prepare the color mixture, bring the cloth to be dyed, soak for 30 minutes, then remove and rinse with water. Then let it dry and repeat this process until you get the desired indigo color. China will focus on repeating at least 5 to 10 times because of the need for indigo fabric or indigo dye products. The color is quite dark, each time taking 4-5 days. The first time it was dyed with indigo, it waited 5-10 days to dry but what is unique and different from other areas is that after dyeing indigo water as desired, it will be dyed red from natural bark such as oak bark etc. will make the indigo-dyed product have a darker color and a reddish indigo. Indigo-dyed fabric in Chinese style is natural indigo-dyed fabric, there are 2 types of patterns. First is using a white pattern printed on a blue background. The second is the use of a blue pattern printed on a white background, patterns on both sides of the fabric have been developed in recent years, focusing on vegetation, mythical creatures and auspicious things. This method gives the fabric an attractive color by using a traditional technique with 3 steps 1) Simple folding process 2) Pleating 3) Color blocking. Japan has a different production center of indigo dye production in the southern region of Tokushima prefecture, Japan. It is a province with a relatively warm climate and close to the sea, so the indigo tree grows well in that area. As a production site that was popular from the past in the Edo period to the present, Tokushima prefecture is also a famous production location for indigo dye products in Japan. Japanese indigo-dyed products can be used for a variety of things, including kimonos made only of low-quality cotton and linen. But there are also a wide variety of goods such as towels, hospitality, pajamas (kaimaki)*, and indigo-dyed scriptures. As a result, indigo-dyed products are expensive and valuable in the context of Japanese society. Both light indigo and dark indigo are popular due to the weather that is like a sea breeze and cold weather. Therefore, Japan pays special attention to the use of raw materials by selecting the harvested

indigo plant and drying it for 4-5 months, then using it as a leavening agent in the production of indigo water. Dried indigo is soaked in water for 2-3 months, sprinkle the water while watching the weather and temperature of the day, watch and stir together, ferment and steam in hot weather. Fermentation using wooden barrels or clay jars of dyes, first add water, lime jar, sugar flour, sake, ash into the indigo jar, buried in the soil and control the temperature at 30 degrees when fermenting until the bubbles appear at the top indicating that it can be dyed. This state is known as “indigo bloom” and the set of processes for making the dye is known as “Aidate”, with each region and craftsman having their own unique indigo making. But in the final stage, it must be checked by eye, hand or smell, sometimes it must be tasted to check the alkalinity. It can be said that the five senses must be used to ascertain. It's truly handmade.

It can be seen that the three countries, although the production process of indigo dye products is similar, but the technical details are different, whether in terms of raw materials, equipment, indigo food, raw materials for producing lye or even the processes of time, water temperature, air temperature and aesthetic preferences in color are different, making the indigo of the three countries unique and beautiful. The characteristics of each area are different, as well as the various production processes are unique and the use of different materials due to the surrounding environment with different materials. The production process in each country is therefore very important to the development of indigo dye products. These processes will show the difference and be able to effectively extend and develop Thailand's indigo dye products.

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