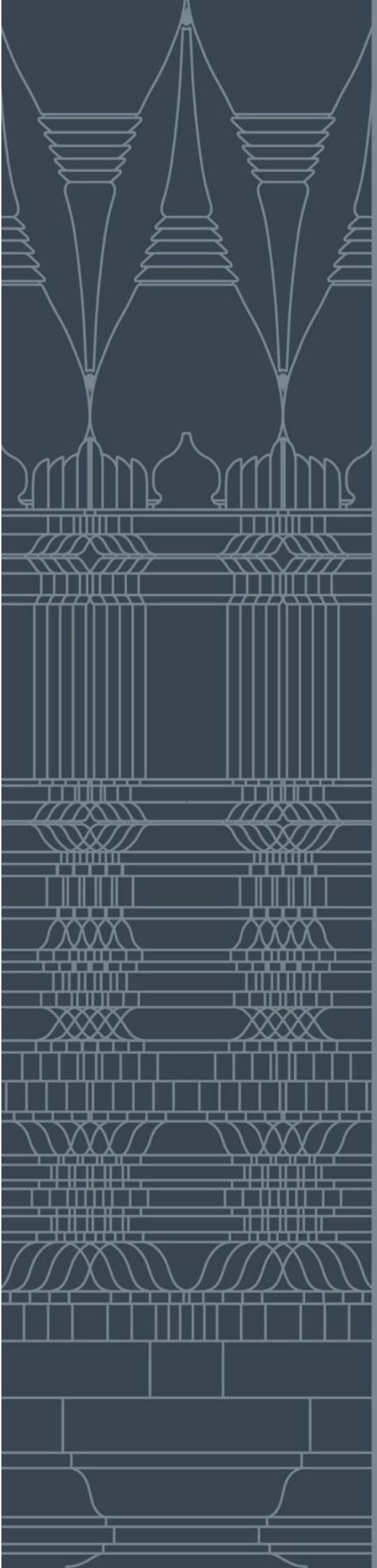


IJAD

International Journal of Architecture, Art and Design

ISSN:2985-0703 (Online) Volume.2 No.1
January – June 2024

Naresuan University
Faculty of Architecture, Art and Design, Thailand
https://so07.tci-thaijo.org/index.php/ijad

International Journal of Architecture, Art and Design (IJAD)
Faculty of Architecture, Art and Design, Naresuan University

Cover Design	**Asst. Prof. Dr. Waraporn Mamee** **Editorial Design Team of IJAD**
Owner	**Faculty of Architecture, Art and Design, Naresuan University** Architecture Building Room ARC 210, Muang District, Phitsanulok Province, 65000, THAILAND Tel. +66 5596 2452 Fax. +66 5596 2454 E-mail: ijad@nu.ac.th
Period of Issue	**Two issues a year** (January-June and July-December)
Objectives	To disseminate academic, research, and creative works to public
Website	**https://so07.tci-thaijo.org/index.php/ijad**

Relevant disciplines for IJAD Art and Design

Creative Products
(Crafts, Textiles, Ceramic, Media Art, Creative Works)
Creative Spaces (Architecture, Interior, Landscape, Built Environment, Urban Planning & Design)
Creative Process (Design Thinking, Design Solution, & Innovation)

Peer Review System	**Double Blinds (3 Peers)**
Illustrations Usage	Responsibility is based on each author's copy rights

Table of Contents

Appreciation

International Journal of Architecture, Art and Design (IJAD) was firstly launched in January 2024 in line with a current vision of the Faculty of Architecture, Art and Design (Naresuan University) in Thailand. This journal aims to disseminate academic, research, creative works to the public. A wide range of art and design disciplines are welcome to publish which is not limited to creative products (crafts, textiles, ceramic, media art, digital art, creative works); creative spaces (architecture, interior, landscape, built-environment, urban planning & design); creative processes (design thinking, design solution, and innovation). This second volume (No.1) was issued between January to June 2024 beginning with an article Hoi An creative city to reflect how the city has integrated crafts and cultural assets to drive its sustainable future; followed by furniture design in rowing sport sector; crafts making from worship flowers, Natural dyeing of water hyacinth strands, and illustration of Thai literature in Tarot Cards Design.

Thanks to all contributions from authors for sharing their creative works. On behalf of the editorial board, I wish this frist issue of the second volume of IJAD 2024 will inspire all readers with insightful knowledge and good practices.

Witiya Pittungnapoo
Editor-in-Chief

International Journal of Architecture, Art and Design (IJAD), Naresuan University

Preservation of Traditional Culture and Creativity Towards the Future of Hoi An City, Vietnam

Hoi An Creative Team - Hoi An Centre for Culture, Sports, Radio and Television
nguyetle.ttvhha@gmail.com
Received: Jan 3, 2024; Revised: Jan 9, 2024; Accepted: Apr 25, 2024; Published online: June 30, 2024

Hội An World Cultural Heritage Site, located on the banks of the picturesque Hoài River, is considered the "Peaceful Meeting Place" of Central Vietnam because it provides a sense of comfort and peace, as well as ancient features that may not be found in other cities. Around the 16th century, Hội An became the major trading port in Cochinchina (the South of Vietnam) with the exchange of many international merchant ships that created unique cultural intersections. The Japanese Covered Bridge, the Chinese Fujian Assembly Hall, the Chăm people's Bá Lễ well, the Vietnamese Trần Family Chapel, and many other historical relics have made it a lively, colourful museum, bearing the mark of many cultures throughout the world.

Today, Hội An has a distinctive appearance with lanterns and modern Asian and European-style coffee shops, as well as a rustic appearance with small alleys and ancient houses under moss-tiled roofs. The tranquillity of beautiful vestiges from the past is still preserved here, despite the fast pace of modern life. It is also blessed by nature, as evidenced by the Chàm Islands, Cửa Đại beach, Hoài river, Bảy Mẫu nipa palm forest, etc. The friendliness and hospitality in the eyes and smile of the local people, serve to make Hội An, an even more attractive destination. All create an irresistible attraction to anyone who has ever set foot in this land. This city's cuisine is also a major drawcard for visitors. Special and unique specialties with culinary value that cannot be found elsewhere include Cao Lầu, Quảng noodles, chicken rice, white rose dumplings, wontons, etc. Each dish contains sophistication in the combination of ingredients and processing along with its long-standing tradition that will appeal to all diners.

Figure 1-2 Folk art of Hat Boi (classical opera) in Hoi An
Photos taken by Mai Thanh Chuong (2023)

In particular, Crafts and Folk Art are outstanding strengths and fields that Hội An has preserved and promoted effectively in recent times. It currently has 5 traditional craft villages with nearly 50 craft crafts including carpentry, pottery, lantern making, coconut/bamboo making, garment making, etc. The ecosystem of craft villages and communities, as well as the long-standing customs, activities and beliefs of residents, have contributed to inspiring, forming and nurturing the richness and diversity of multiple folk arts such as boat rowing singing (bả trạo), repartee chant singing (hò khoan), traditional bingo with singing (Bài Chòi), poems recital, 4 line-singing (hò vè), classical opera (hát

Bội), ritual dance, etc. which truly and vividly reflect the socio-cultural characteristics of this region and have become an essential part of the spiritual life of Hội An people. Those include the Art of Bài Chòi, which was inscribed in the UNESCO Representative List of Intangible Cultural Heritage of Humanity (2017).

To make locals and the public absorb, appreciate, and be able to live with crafts and folk arts so that the government can rely on them to effectively conserve, restore and develop. When the State of Vietnam issued a strategy to develop Vietnam's cultural industries, Hội An caught up with the implementation of these cultural activities, and continued to take culture as a driving force for socio-economic development. Over the years, Hội An city has focused on investing in developing cultural industries and these steps contributed to Hội An becoming one of the 66 creative cities for crafts and folk art joining the UNESCO Creative Cities Network in 2023.

Figure 3 Sacred dog's head, Unicorn's head, Earth God's mask-making (Left) and
Figure 4 Taboo Bamboo Workshop in Hoi An (Right)
Photos taken by Mai Thanh Chuong (2023)

Being aware of the thickness and depth of the inherent historical and cultural values during the journey of construction and development, Hội An has preserved and promoted traditional art forms, created typical cultural tourism products, and marked the destination's own identity. It has established and maintained many cultural tourism products based on culture, history, and community life, typically periodical traditional art performances, water puppet shows, Bài Chòi singing, hò khoan singing, folk singing, bả trạo singing, tuồng singing, and "Hội An Legendary Night".

Figure 5-6 Performing art and releasing paper lanterns on the Hoai River, Hoi An Ancient Town at night. Photos taken by Witiya Pittungnapoo (15/06/2023)

Hội An has combined traditional cultural identity with modern trends, restored traditional festivals, combined with contemporary cultural and artistic events, and organized annual traditional festivals such as the Lunar New Year Festival, Lantern Festival, Nguyên Tiêu Festival, Mid-Autumn Festival, Hội An traditional occupations' beauty, Hội An – Japanese Cultural Exchange, Korean Cultural Days in Hội An, etc. In addition; culture and tourism events such as the Quảng Nam Heritage Festival, International Choir Competition and Festival; and national and international events like Miss Vietnam, Miss Universe, Miss Earth, APEC conference, etc. were also hosted by Hội An. This helps the local cultural industry to become more diverse, expand, exchange, and integrate regional and multinational cultures.

Figure 7 Traditional Lantern Shop (Left) and **Figure 8** Lanterns decorating the alleys of Hoi An (Right). Photos taken by Witiya Pittungnapoo (10/10/2019)

With the unique characteristics of the land and people of Hội An; in recent years, although it encompasses a modest area and population and is a district-level administrative unit, it has always welcomed artists and artisans from all over the country to create Vietnamese culture. This city has gradually formed many models, and cultural creative spaces that started to become famous; such as Hội An Lune Centre for the Performing Arts with plays À Ố show, Tedar, Morning Dew, Hội An Impression Theme Park with its famous "Hội An Memories Show".

The results of these activities in the field of crafts the folk arts in Hội An have actively contributed to the cause of preserving and promoting culture imbued with a national identity. This is also the driving force to contribute to the key economic development of the locality. The preservation and promotion of traditional culture, in conjunction with contemporary artistic and cultural trends, have brought socio-economic effects; contributed to educating and raising the awareness of the younger generation about culture, history, and tradition; as well as actively contributed to creating more jobs and income for the community. This is a very special thing in Hội An city, showing that, once the traditional culture is effectively promoted, it will offer great economic value. Culture also becomes an income-generating product for locals and businesses, and it helps to promote and introduce Hội An's image to friends and visitors. International organizations and many countries have invited Hội An to exchange, cooperate, perform cultural and artistic activities, and introduce craft products such as Japan, Hong Kong, China, Thailand, Korea, Italy, Hungary, Germany, etc. Through these trips, Hội An culture and tourism have the opportunity to be widely promoted in the international arena, especially the potential tourist markets of Hội An like Korea, Japan, Germany, and other European countries. All of the afore-mentioned efforts have contributed

to an average annual increase of 20% in tourist arrivals to Hội An World Cultural Heritage Site, increasing spending, and continuously improving the income of businesses and people.

Traditional craft villages and crafts in Hội An have also created significant income for locals, such as Trà Quế Vegetable Village, Thanh Hà Pottery Village, Kim Bồng Carpentry Village, and others. In addition to producing products for the market, they are also exploited by the city for tourism purposes, which has resulted in long-term employment for locals. Other crafts, such as lantern making, carving, sculpture, tailoring, etc. are also growing in popularity, attracting many young people to engage and earn a steady income from craft work.

Figure 9 Lang Gom Thanh Ha Pottery Village (Left) and **Figure 10** Lang Cui Lu Driftwood Village (Right). Photos by Witiya Pittungnapoo (16/06/2023)

Preserving and promoting traditional cultural values, focusing on building and developing cultural industries in Hội An, and joining the UNESCO Creative Cities Network benefit Hội An in terms of positioning its brand, promoting its image in all fields of culture and creativity, attracting investment, and focusing on educational development programs as well as cultural and creative events for sustainable development. The resources and strengths of its history, culture, nature, and people will also be maximized in the right direction. This is the basis for the city to focus on introducing its images and policies to preserve and develop the cultural field more widely. Furthermore, Hội An can mobilize resources, knowledge, and creativity to focus on crafts and folk art activities, as well as other fields. At the same time, it provides chances for learning, education, and replication of innovative models; as well as creating a foundation for startup activities.

"Hội An - a UNESCO Creative City" is more than just a title, it is a goal to strive, fulfil commitments, and bring values and benefits to the community. In addition to continuing activities to preserve and promote crafts and folk art; Hội An will have to implement committed initiatives; create conditions and promote development and creativity in other fields; connect, exchange, and share experiences with other cities inside and outside the Network; and strengthen activities to expand and promote the development of creative cultural fields in the Network.

Development of Furniture as Equipment Storage for Rowing Athletes

Tanawat Saenprasert[1], Aungkab Boonsung[2] and Singha Prarom[3]*

Faculty of Industrial Technology, Uttaradit Rajabhat University
*E-mail address: Singha@uru.ac.th
Received: Mar 11, 2024, Revised: Apr 20, 2024, Accepted; May 9, 2024, Published online: June 30, 2024

Abstract

The development of furniture as equipment storage for rowing athletes examined according to the storage needs and athlete behaviour. In order to propose guidelines for oar cabinet design data was collected according to their spatial characteristics and oar use. The study suggested that 2 types of oar was used by the rowing club, including rectangular and Bodhi leaf shaped oars, both types have an adjustable length handle according to the rower's arm span. The test with storing oars found that the oars should be placed upright to allow for easy handling and should also be fastened to prevent the oar blade from twisting. The design process starts with a co-planning of work among teachers, students and the Rowing Club to design the feature and function of furniture as equipment storage for rowing athletes. The process and steps for design thinking was employed as a guide for furniture equipment storage for rowing athletes by 1) Empathising and defining, 2) Collecting ideas, and 3) Prototyping and testing development. This study shows a local identity of oars and storage should be created in line with users'space, behaviour, and ergonomics. Additionally, durability of the material used is crucial to support the athletes' rowing skills and performance.

Keywords: Furniture, Rowing Oars Cabinet, Rowing Club of Trontrisin School

Introduction

Boats have been part of Thai society for a long time (The Rowign & Canoeing Association Of Thailand, 2018, On-line) because, in the past, boats were the main form of water transport in daily life and in times of war. This had led to finding ways of making the boat reach its destination safely and as fast as possible. In addition, boats have long been used in important ceremonies and rowing boats that are currently in use include those in competitions, ceremonies, water travel, and traditional rituals in certain areas. With the rapid changes in technology today, boats as transport have become less popular.

Currently in the rowing competition, training practices are performed for physical preparation before proceeding actual competition to make the muscles become habituated. Some of the clubs may practice throughout the year since there are now competitions all year round and many competition fields to compete in. There are 2 types of oar blades: one made of wood and the other made of plastic. The length of the oar depends on the arm span of each rower. Where the athlete's oar is made of wood, it will tighten its grip while pulling it, which is more practical and cheaper compared to oars made from other materials. However, a property of wood is that it absorbs water and enlarges. After training, the athletes kept the oars at home. During the day because of the hot weather, water in the wood evaporates. As the oar blade absorbs water which later evaporates, the oar blade warps, and as a result the

oar blade is unable to counter the current, the speed of the boat decreases and more rowing force is needed, and the oar blade eventually cracks. Mostly, rowing athletes check their oars every time prior to training. In the case of marked and damaged blades, maintenance is done by using solder paste mixed with fine sawdust to fill in cracked gaps. The problem of warped blades may be solved by placing a clamp in the middle of the blade to prevent it from bending or twisting. The application of a final coat of paint or varnish for waterproof. Athlete training follows the training procedures of the club coaches. Training will be over twice the distance of the competition events. For each training session, athletes bring their oars from home, and if they do not have one, they can borrow one from the club for training. Young rowers, they often travel from home to the training location on a bicycle or motorbike with one hand controlling vehicle and the other holding their oars, hence they might cause an accident on the way. Because of this, it is necessary to design furniture to store oars and other equipment for rowing athletes at the club.

Objectives

The current study aims to develop furniture as equipment storage for rowing athletes.

Methods and Materials

In the development of furniture to store equipment for rowing athletes, the target group includes 125 rowing athletes of the Trontrisin School Rowing Club located in Baan Kaeng Subdistrict in Uttaradit Province. This sport of rowing adds to the uniqueness of the school. This school was granted the 2011 Thailand Championship Award for racing12 dragon boats for males under 18 years of age, and has also won various competition awards for boat racing. In this study, the principles of furniture design were applied in terms of function and also to prevent theft. Safety considerations have been taking-into account to ensure that the cabinets are safe for users. Durability and functionality are both important as the cabinets need to carry the weight of many oars for a long time. Carbon steel was used as the main material for both the weight-bearing structure and other parts. Design convenience relates to the accommodation of the oar dimensions user height, and pickup distance to provide for ease of use.

Results

To develop furniture as equipment storage for rowing athletes, the guide to proceed according to the set objectives started with an investigation of rowing athletes' behavior during their travel, training breaks, boarding and rowing, and keeping of oar blades; a preliminary analysis to further design oar cabinet features according to its function and an examination of the dimensions of oar blades. The details are as follows:

1. Empathize and Define It involves making an in-depth understanding about the target group by adjusting the mindset of both the designer and the rowing athletes so as to see the overall picture of the project, and administering unstructured interviews with the target group as unidentified interviewees, so that conclusions can be drawn to guide the development of furniture corresponding to its function.

Figure 1-2 Field investigation on the context of rowing athletes

Based on the field investigation, 2 types of oars are used by the athletes, i.e. wooden oars and plastic oars in both training and competition. Most athletes brought their oars from home and took them back home after training for they are expensive and could get lost. They rode motorbikes to school and when attending training sessions. During rest or while waiting to board for rowing, they placed their oars by the riverside or on the stairs. On non-participatory observation, if the athletes ride alone on a motorbike, they used the right hand to control the motorbike and the left hand to hold their oar blades, which puts them at risk of having an accident. They kept personal items under the motorbike seat and during attending a rowing competition, they placed them close together and must have someone keep an eye on them to prevent theft.

Figure 3-4 Rowing athletes
(Source: Phairat Sookkharot, 2024, On-line)

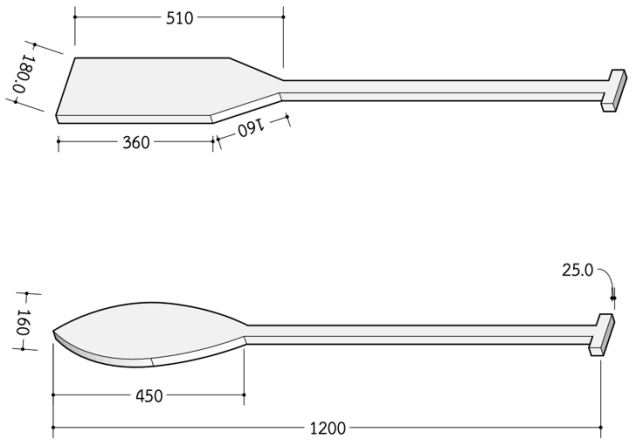
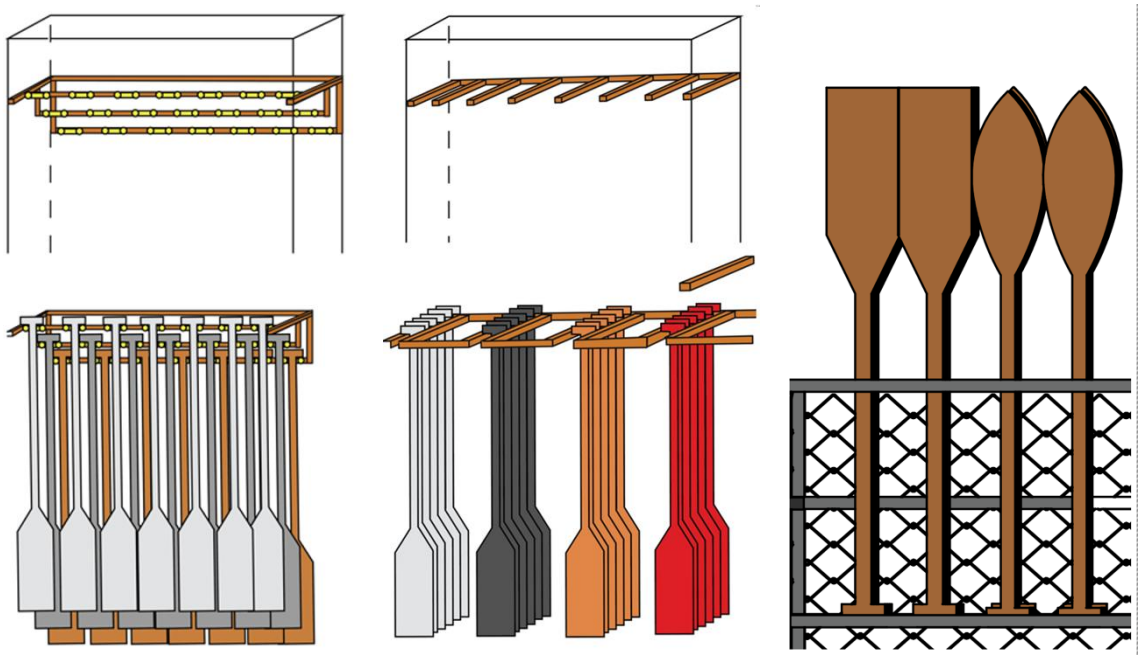


Figure 5 Feature of oar blades

Figure 5 illustrates 2 types and sizes of the oar blades: the first one is rectangular in shape,180 mm wide x 510 mm long x 25 mm thick and adjustable in length with adjustable length according to the athlete's arm span; and the second one in leaf-shape of 160 mm wide x 450 mm long x 25 mm thick. Its length is also adjustable according to the athlete's arm span. Figure 6 illustrates the test of placing the oar vertically and horizontally, reducing the contact of oar blades with other equipment. As the blades have a tool to prevent twisting and they differed in size, the handle was thus used to provide the size to determine the spacing between each slot, which was 40 mm wider than the handle size with a spacing of 500 mm wide. The oars were provided with 4 slots of 540 mm wide altogether and each slot can contain 12 oars, thus making it available for a total of 48 oars.



Pattern 1 Pattern 2 Pattern 3

Figure 6 Modeling patterns of oar blades storage
(Source: Tanawat Seanprasert, 2022, p. Appendix)

2. Ideas involved in the construction after framing (Define) the problems in developing furniture to store the equipment of rowing athletes, that arose out of the need for keeping athlete's personal items and the oars, and also allowing easy transport to other competition locations. The sketch of the ideas for furniture development was presented to the rowing athletes followed by brainstorming sessions based on the needs expressed by the athletes to facilitate the storage of their equipment, first aid kit, chart batteries and hanging space for life jackets.

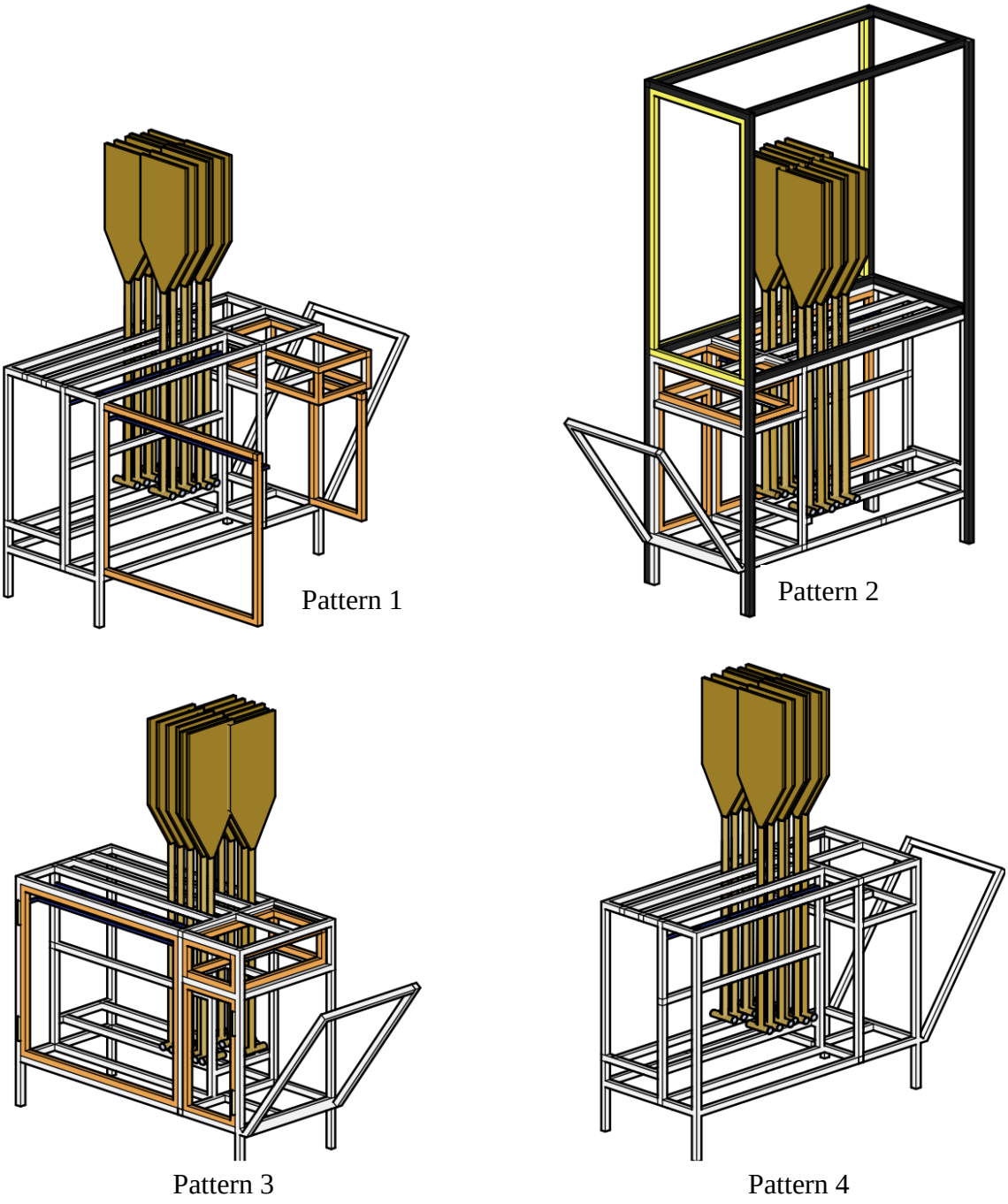


Figure 7 Guidelines for furniture design
(Source: Tanawat Seanprasert, 2022, p. Appendix)

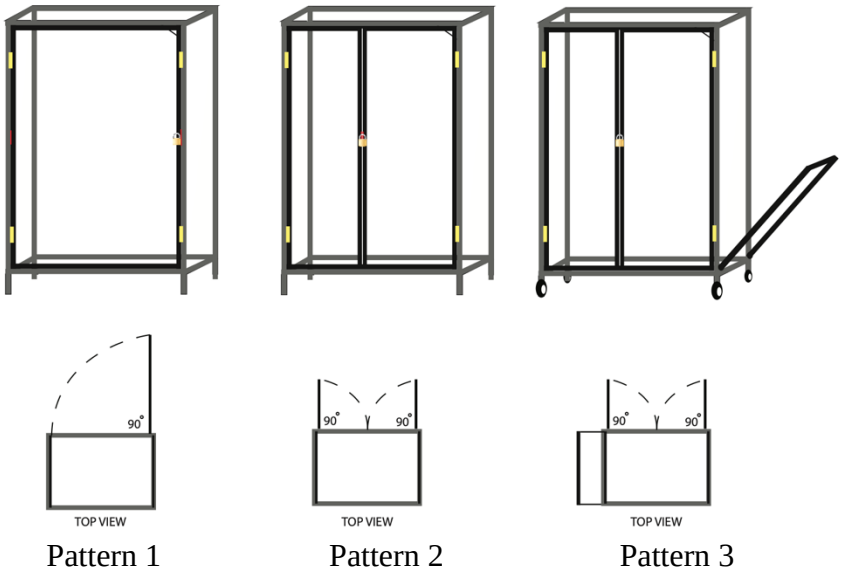


Figure 8 Design concept of furniture frame
(Source: Tanawat Seanprasert, 2022, p. Appendix)

The frame design takes into consideration the principles of furniture design including function, safety, durability, materials, structure, convenient to use and the beauty of the oar cabinet. In Figure 8, the design of frame in part of the oar storage included the insertion of steel grids in 3 slightly different patterns. Pattern 1 with a hinge to open on the right side. Pattern 2 is divided into 2 compartments that open in the middle. Pattern 3 with added wheels and a push bar for ease of moving as it has to be transported to the athletes using oar blades in rowing boat. The dimensions were determined by the space of oar blades, life jackets and equipment compartments. The sketch furniture frame was presented to the research sample group and it was suggested to adjust to Pattern 3 in the opening and closing that the opening should not be there however, the oar blades should be pulled up from the top, and also adding an equipment compartment. The material used is waterproof.

Figure 9-10 Field visit for the conclusion of the design concept
(Source: Tanawat Seanprasert, 2022, p. Appendix)

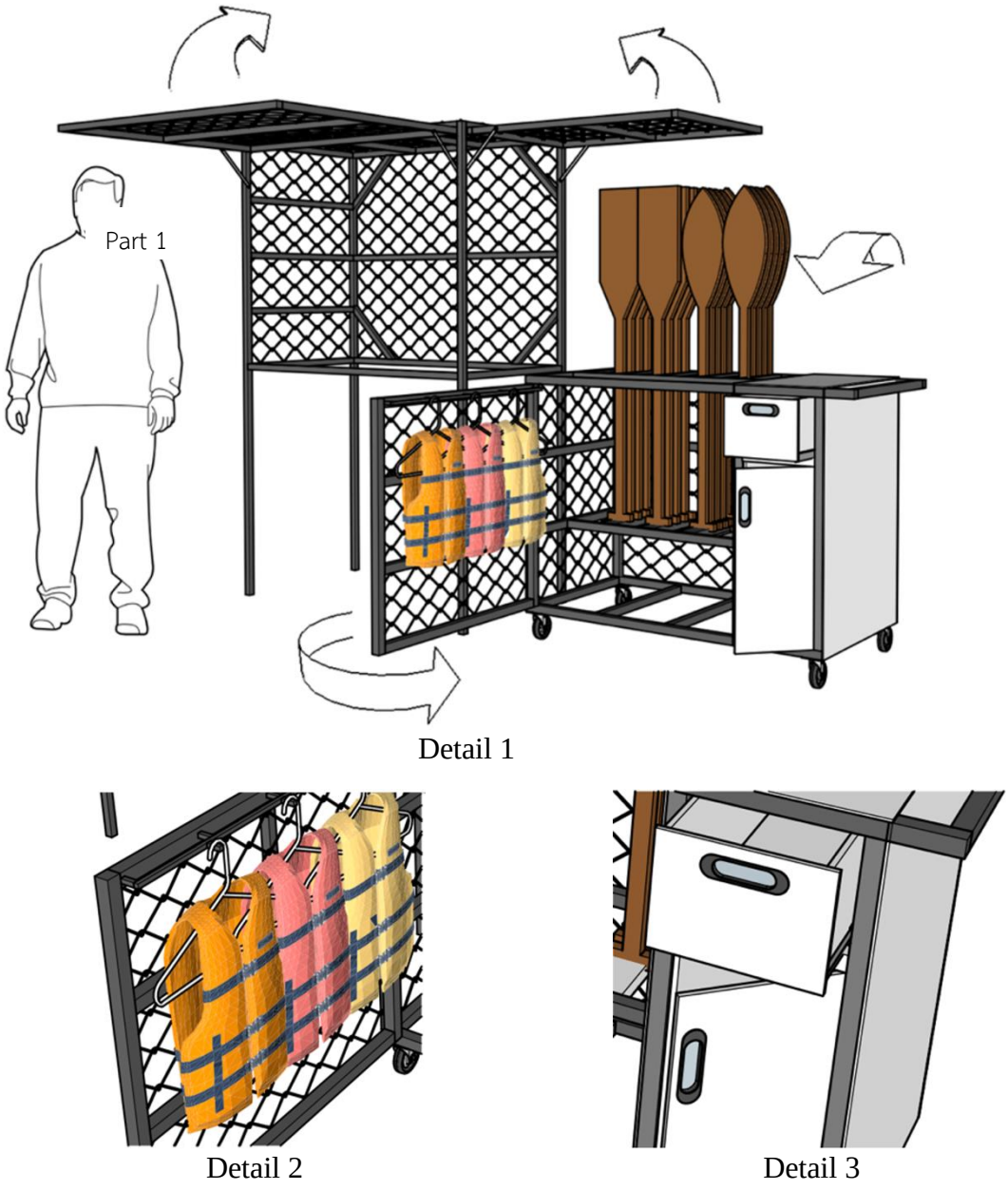


Figure 11 Details of the furniture frame

Detail 1 in Part 1 shows how to open and close the furniture as a cabinet for storing the equipment of rowing athletes. Carbon steel square tubes were used as the structure to provide strength, with steel grids fixed at 2 sides to prevent theft, hinges to help open and close, and steel hooks to bear the weight. Part 2 is the compartment for storing rowers' equipment, using carbon steel square tubes as the main structure, with grids fixed, handles and wheels for easy moving. This compartment consists of slots to store the oars. Detail 2 shows how to hang a life jacket, and Detail 3 shows how to open and close the compartment for storing the rower's personal items.

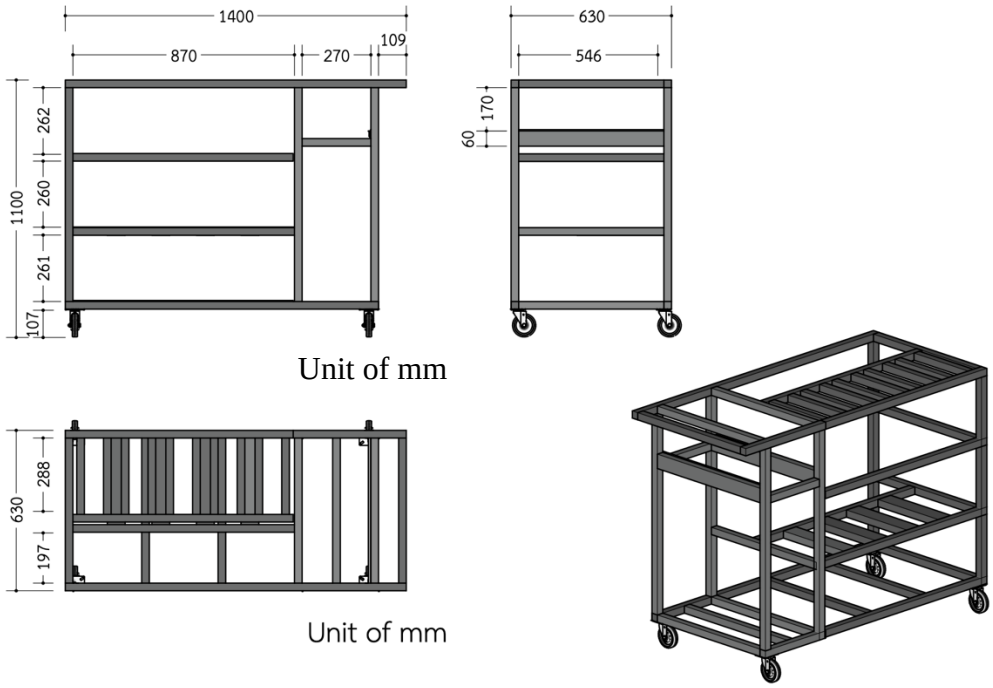


Figure 12 Patterns of furniture frame in Part 2

Figure 12 illustrates the patterns of furniture frame 630 x 1,400 x 1,100 mm, using carbon steel square tubes welded together. The height of each compartment is approximately 260 mm. Figure 13 illustrates the overall dimension of combined Part 1 and Part 2 in a size of 690 x 1,370 x 2,000 mm.

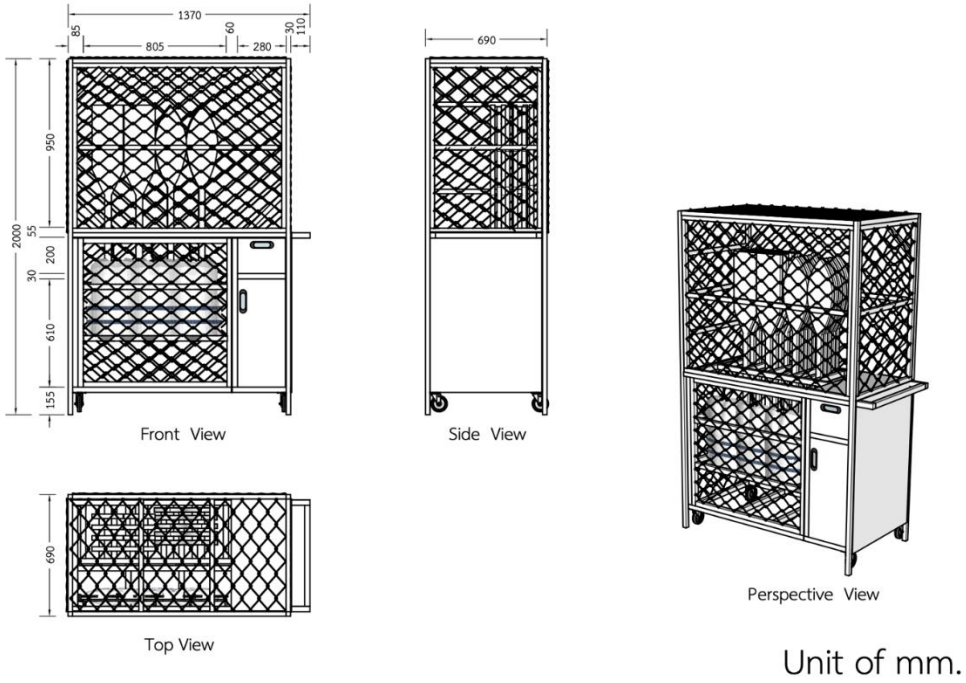


Figure 13 Dimension of furniture

3. Prototype and Testing - The testing was done by the athletes of Trontrisin School Rowing Club. It was found that the function of the furniture corresponded to the function as a storage for oars and equipment, hanging the club's life jackets and allowing for ventilation, prevention of theft, ease of movement with wheels according to the needs identified and discussed at a group meeting. This piece of furniture can be moved and taken to various competition locations to store equipment and oars. The cabinet may be used outdoors as well.

Figure 14 Furniture as equipment storage for rowing athletes

Conclusion and Suggestions

The development of furniture as storage for the equipment of rowing athletes is in line with the design and thinking processes consisting of 3 steps namely: making an in-depth assessment of the target group (Empathize) regarding the rowing athletes' behaviour and use of oars and also spatial limitations, and determining the scope of problems (Define) on where to place oars, life jackets, and to keep important items, including ease of moving; constructing the ideas (Ideate) comprising draft ideas, draft design, and participatory conclusion of concepts with the club; accordingly constructing a prototype (Prototype) to be the best, that is, ready for use; and in every step testing with the target group (Test) to make it suitable for use. The design of limited space and the design considering the functioning nature of the oar-cabinet corresponded to the activities of rowing athletes. This conforms to the article on the design contributing to identity creation for a small hotel: a case study of Ban-Sri Family Hotel, Kabinburi district, Prachin Buri province (Patsara Srirungruangchai. Miyoung Seo. Kriangsak Khiaomang, 2022, p. 56) Firstly, a local identity was examined before interior design that may be applicable to local identity to create work pieces and combined theory to create usable space for users. Similarly, the design of the oar cabinet considered the athletes' body and behaviours, as well as the function that is different from other athletes from other clubs. It also aligns with the Modular system for outdoor furniture in Larn Hin Korn Wat Panyanant Ram Larn Hin Korn Wat Panyanant Ram Area (Thirarat Srikhongchan, 2022, p. 85) suggesting that the design of outdoor furniture for maximum usability and responding to the space that should take into account the ergonomics of space, the durability of the material used and the ability to produce by the skill of general technicians.

Acknowledgment

This study is part of the Thesis 2 course under the Product Design Technology program of Uttaradit Rajabhat University. Thankfulness and appreciation are extended to those students, experts, and others involved including the rowing club athletes and their Instructor Pairat Sukroj of Trontrisin School, including the Hat Song Kwae Subdistrict Administrative Organization, Uttaradit Province.

References

Patsara Srirungruangchai. Miyoung Seo. Kriangsak Khiaomang. (2022). The design contributing to identity creation for a small hotel A case study of Ban-Sri Family Hotel , Kabinburi district, Prachin Buri province. *Art and Architecture Journal Naresuan University*, 12(1), 56-70.

Phairat Sookkharot. (2024). *Rowing a boat*. Retrieved 10 August2023 from https://www.facebook.com/phairat.sookkharot

Praima Israsena Na Ayudhya. Chujit Treerattanaphan. (2019). *Design thinking : learning by doing*. Thailand Creative and Design Center.

Tanawat Seanprasert. (2022). *Paddle locker design for rowing athletes trontrisin school.* [Special Project: bachelor's, Uttaradit Rajabhat University]. Uttaradit Rajabhat University.

The Rowign & Canoeing Association Of Thailand. (2018). *Association history,*. Retrieved 1 November 2023 from https://www.rcat.or.th/Association history/#

Thirarat Srikhongchan. (2022). Modular system for Outdoor furniture in Larn Hin korn Wat Panyanant Ram Area. *Art and Architecture Journal Naresuan University*, 13(2), 70-88.

Trontrisin School. (2013). *Trontrisin School*. Retrieved 10 November 2023 from http://www.tts.ac.th/datashow_1201

Swan Pattern as in Stucco Decoration on Prang, from Worship Flowers at Wat Chulamani in Phitsanulok Province, Thailand

Jennet Menlapmo[1*] and Nirat Soodsang[2]

[1-2]Department of Art and Design, Faculty of Architecture, Art and Design, Naresuan University Phitsanulok, Thailand
*E-mail address: jennetm66@nu.ac.th
Received: Mar 19, 2024, Revised: Apr 18, 2024, Accepted; May 21 2024, Published online: June 30, 2024

Abstract

This study aims to 1) study the patterns of stucco decoration on Prang of Wat Chulamani, Phitsanulok Province; 2) explore the process of transforming and forming products from worship flowers; and 3) propose a guide to developing souvenir products in the patterns of stucco decorated on Prang, from worship flowers at Wat Chulamani, Phitsanulok Province. It uses qualitative research methodology including a study of historical information and field records, along with an experimental study on materials. The results suggest that the unique patterns of stucco decoration on Prang at Wat Chulamani is a row of Hong Karb Mala (Swan catching bouquet), appeared at their sides, walking in a row, with a bouquet in their mouth, their tail in Kanok pattern, and a range of floral patterns all around the Prang. The process of transforming and forming worship flowers into products suitable for extended development as souvenir products was to bring the dried flowers to the experiment in the forming process using both dried flowers or dried flowers powder, ideally with Formula 3 in a ratio of glue powder: water: dried flowers as 10: 5: 1. The resulting workpiece had its surface showing the appearance and uniqueness of worship flowers. The SCAMPER technique was applied to design Hong Karb Mala and floral patterns as in the stucco decorated on Prang of Wat Chulamani, Phitsanulok Province, which could be developed as souvenir products. Sketch 2 was found suitable to be developed as souvenirs as it harmonized with the worship flowers in the forms of a decorative picture frame and keychains.

Keywords: Hong Karb Mala (Swan catching bouquet), Stucco pattern, Wat Chulamani, Worship flowers

Introduction

Wat Chulamani is one among the important and ancient historical sites in Phitsanulok Province. It is located in the administrative area of Moo 2, Tha Thong Subdistrict, Mueang District, Phitsanulok Province. Krom Phraya Damrong Rajanubhab assumed that Phra Prang at this temple was built during the time when the Khmer Empire had been in power and the temple area was believed to be the original location of Phitsanulok city. The stucco decoration on the Prang is regarded as precious sculptures representing the style and features that had been passed down as evidence of the thriving arts (Trakul, 2002). The stucco decorations are unique and distinct especially Hong Karb Mala (swan catching bouquet) unlike anywhere else and the meticulous and delicate floral patterns very common in the Lanna art. They differ from those traditional Prang decorations of the Sri Ayutthaya period.

The decorations were carried on from the previous constructions in the original model of Khmer Prang around the early 19th century (Buddhist Era) at Lopburi and was passed on to Ayutthaya in the 20th Buddhist century prior to the Prang of Wat Chulamani (Santi, 1996).

Figure 1 Prang at Wat Chulamani, Phitsanulok Province

Wat Chulamani is a sacred place that is significant for Buddhists as they give respect and have faith and come to worship for their good fortune, especially on auspicious Buddhist days. The important offerings for Buddhists to express their respect and faith are fresh flowers that bloom beautifully which are offered to this sacred place with a heart of great pleasure. Buddhist ideology mentioned about the belief of using felicitous flowers in religious ceremonies with an aim to enhance the propitiousness and sanctity of the ceremonies, and that, the belief began to spread and increased popularity among the general public, as a way to strengthen positive energy and flourish mentally (Chanatip, 2021).

Over time, these flowers withered and decomposed and their beauty turned into something decayed and ugly with a loss of value, beauty, shape, and colour, and finally becomes waste which ultimately affects and pollutes the environment. Phitsanulok Provincial Office of Local Administration (2021) reported the amount of solid waste generated in Phitsanulok Province in the fiscal year of 2021 (October 2020 - June 2021) for a total of 196,567 tons consisting of organic waste (biodegradable waste) at the top level of 113,456 tons.

This research valued these fresh flowers as worship offerings and proposed an idea to the experiment of transforming and developing these starting materials into products or souvenirs that represent the distinct identity of stucco decorations on Prang of Wat Chulamani. It not only generates added value to these worship flowers but also promotes the wisdom and culture of Phitsanulok Province.

Objectives

1. To study the patterns of stucco decorated on Prang of Wat Chulamani, Phitsanulok Province
2. To examine the process of transforming and forming products from warship flowers.
3. To propose a guide to developing souvenir products in the patterns of stucco decorated on Prang, from worship flowers at Wat Chulamani in Phitsanulok Province

Expected Benefits

1. The features and patterns of stucco decorated on Prang of Wat Chulamani, Phitsanulok Province

2. The process of transforming and forming products from worship flowers suitable for product development.

3. The prototypes of souvenir products in the patterns of stucco decorated on Prang, from worship flowers at Wat Chulamani in Phitsanulok Province

Concept and Theories

The product design employed the Eco-Design with the 4 R principles including Reduce: Reduced the use of resources in various stages of product life cycle; Reuse: Repeated use of parts of products or used products; Recycle: Reprocess parts of products or products in the destruction stage for reuse; and Repair: Products made for easy maintenance to prolong the use life (Thapanut, Sarawut, and Jariya, 2020).

The design approach of the SCAMPER technique is to seek solutions to generate new ideas or products which was applied in the design of souvenir products. The technique consisted of these letters: S = Substitute is to replace; C = Combine is to integrate or synthesize; A = Adapt is to adjust the design; M = Modify/Magnify is to minimise, mitigate, or alter; P = Put to another use is to use in a different way; E = Eliminate/Elaborate is to remove or simplify; and R = Reverse/Rearrange is to flip or reorganize (Atikhun et al., 2021).

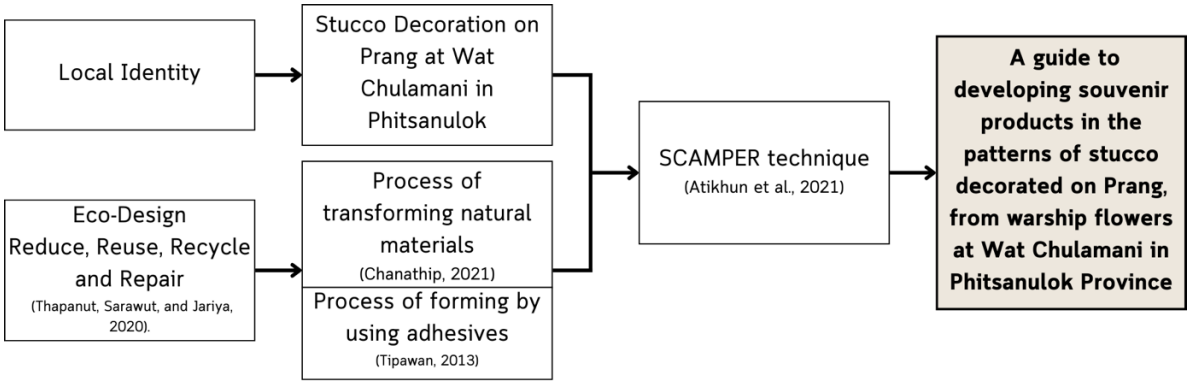


Figure 2 Conceptual Framework

Research Scope

Scope of contents

1. Information from documents, textbooks, and related research.

1 . 1 Features and patterns of stucco decorated on Prang of Wat Chulamani, Phitsanulok Province

1.2 Process of transforming and forming natural materials

1.3 Design of souvenir products

2. Information from field survey to explore the patterns of stucco decorated on Prang of Wat Chulamani, Mueang District, Phitsanulok Province.

Scope of research instrument

1. Record form for the experiment to transform worship flowers

2. Record form for the experiment to form worship flowers

Scope of research site

Wat Chulamani, Tha Thong Subdistrict, Mueang District, Phitsanulok Province

Definition of Terms

1. Hong Karb Mala refers to the pattern of swan catching a bouquet of flowers as appeared on the stucco decorated on Prang of Wat Chulamani, Phitsanulok Province

2. Worship flowers refer to flower bouquets or flower garlands that were offered for the worship in Wat Chulamani, Phitsanulok Province, which in here were marigolds.

Methodology

1. Study on the patterns of stucco decorated on Prang of Wat Chulamani, Phitsanulok Province

1.1 Investigate and search information from documents, textbooks, and research related to the patterns of stucco decorated on Prang of Wat Chulamani.

1.2 Field visit to explore the patterns of stucco decorated on Prang of Wat Chulamani; collect data and record as photographs (Figure 3).

Figure 3 Patterns of stucco decorated on Prang of Wat Chulamani

2. Examination on the process of transforming and forming worship flowers into products.

2.1 Investigate and search information from documents, textbooks, and research related to the process of transforming and forming natural materials using the Eco-Design concept.

2.2 Experiment with the process of transforming and forming worship flowers, and record data using an experiment record form.

Process of transforming worship flowers

The experiment was done to maintain the beauty of flowers with the method of drying so as to express their beauty and a scent of worship flowers (Chanathip, 2021), choosing marigolds for the experiment as they are commonly used in the form of garlands to offer to monks (Figure 4), as shown in Table 1.

Figure 4 Viharn of Luang Pho Phet, Wat Chulamani, Phitsanulok Province.

Table 1 Experiment of the process to dry warship flowers

Time of Experiment	Before the Experiment	2 Days	7 Days
Picture			
Appearances	Bright yellow petals, very high moisture, soft petals	Darker coloured petals, moderate moisture, petals starting wither, smaller size	Petals without moisture, dry and firm, smaller size

Process of forming worship flowers

The experiment with the process of forming worship flowers was derived from the study of local wisdom to create pollen Buddha images in Lan Na that reflected the culture, value, and meaning of objects as a symbol of faith (Tipawan, 2013). The raw materials used included dried worship flowers, wood glue powder, and clean water.

The experimental steps (Figure 4) are as follows: 1) Prepare dried flower powder by chopping or grinding dried flowers into small pieces, 2) Mix wood glue powder, clean water, and dried flowers or dried flower powder using each formula and ratio as shown in Table 2 and blend them well, 3) Pour the mixture into the mould and wait for it to dry. Remove the workpiece from the mould. The details of the experiment are shown in Table 2.

Figure 5 Experiment of forming worship flowers

Table 2 Experiment of forming worship flowers

Formula	Dried Flowers	Dried Flowers Powder	Appearance
Formula 1 40 g of glue powder 20 g of water 1 g of dried flowers			No bubbles in workpiece Dried flowers appeared very slightly
Formula 2 40 g of glue powder 20 g of water 2 g of dried flowers			Small number of bubbles in the workpiece Dried flowers obviously appeared
Formula 3 40 g of glue powder 20 g of water 4 g of dried flowers			Large bubbles in workpiece Dried flowers appeared largely in petal form

3. Proposing a guide to developing souvenir products from worship flowers in the patterns of stucco decorated on Prang of Wat Chulamani, Phitsanulok Province.

3.1 Design sketches of souvenir products from worship flowers in the patterns of stucco decorated on Prang of Wat Chulamani, Phitsanulok Province, using SCAMPER technique.

Three sketches for souvenir products (Figure 6) combined the swan catching bouquet with floral patterns as they both are unique patterns of stucco decorated on Prang of Wat Chulamani. A sketch was selected to further develop the concept into souvenir products in harmony with the belief in worship with flowers, which includes decorative picture frames and keychains, using a computer program to create 3D models (Figure 7).

Figure 6 Three sketches of pattern design for souvenir products

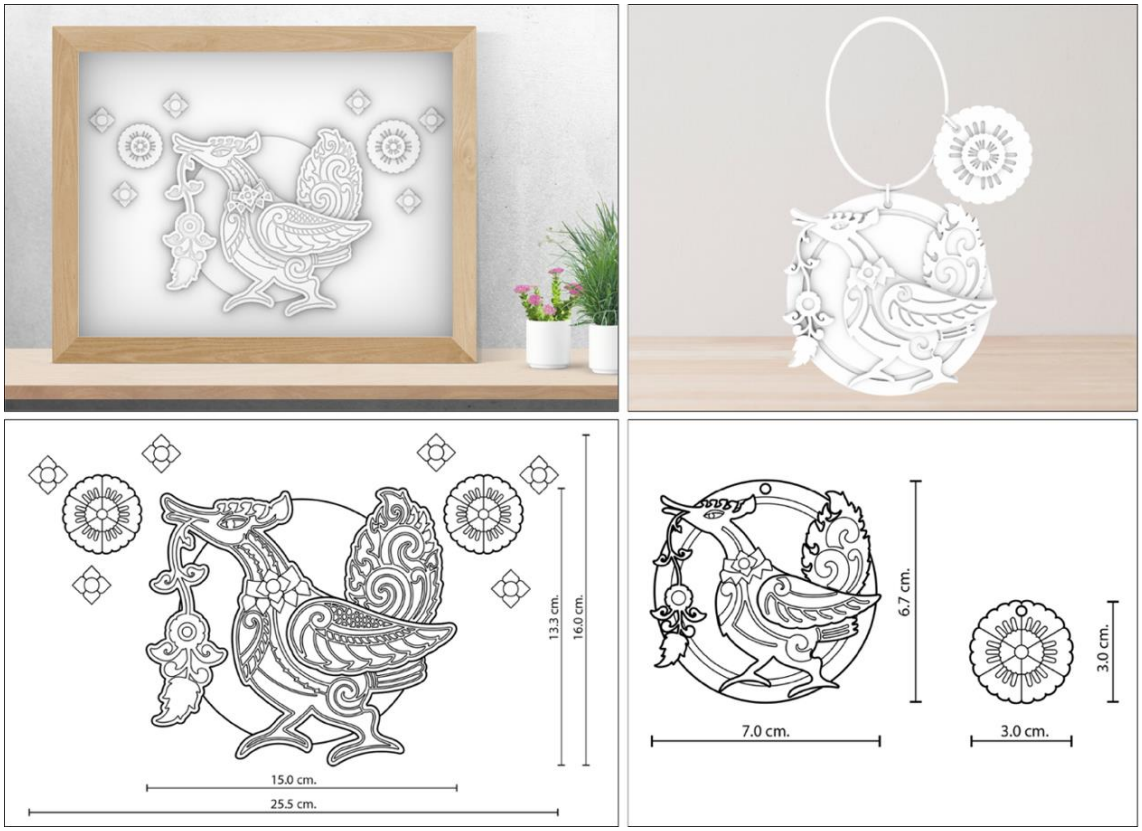


Figure 7 The 3D models of souvenir products

3.2 Create prototypes of souvenirs in the patterns of stucco decorated on Prang from worship flowers at Wat Chulamani so as to guide product development.

The steps to create souvenir products in the patterns of stucco decorated on Prang, from worship flowers at Wat Chulamani were 1) creating product prototypes, 2) making silicone rubber moulds, and 3) forming products with worship flowers.

1) Create the prototypes for casting moulds by printing sample workpieces of souvenir products created by a computer program with a 3D printer as shown Figure 8. The material used for printing is PLA (Polylactic Acid) as biological plastic produced from natural materials and biodegradable.

Figure 8 Printing sample workpieces with a 3D printer.

2) Make silicone rubber mold by placing the prototype into a frame, apply a thin layer of vase line or oil to the template to prevent it from sticking to silicone rubber. Mix well the silicone latex and accelerator well and pour into the prepared frame, wait for it to dry and then remove the silicone mold from the prototype, as shown in Figure 9.

Figure 9 Making a silicone rubber mold

3) Forming products of worship flowers by preparing raw materials of glue powder, water, and dried flowers or dried flower powder; mixing them in the ratio of experimented formula and pouring into silicone rubber mould; waiting for it to dry and removing the workpiece from the mould; and finally retouch the details and rims of the workpiece, as shown in Figure 10.

Figure 10 Forming the product of worship flowers

Results

1. Study on the data and field survey of the Prang of Wat Chulamani, Phitsanulok Province

Study results found that the stucco decorated on Prang had distinctive and unique patterns of Hong Karb Mala (swan catching a bouquet) appeared by their sides, walking in a row with a bouquet in their mouths, and the tail of beautiful curved Kanok pattern. Each of the swans differs in features. Two types of swan patterns were found (Figure 11), the one with proportional size, high and low relief, lithe patterns; and the other one with a relatively long neck and more simple pattern than the first one. There were also floral patterns (Figure 12) including flowers, bouquets, leaves, and curved vines of various styles assembled around the Prang.

Figure 11 Stucco decoration on Prang in Hong Karb Mala pattern (Swan catching bouquet)

Figure 12 Stucco decoration on Prang in floral patterns

2. Study on the process of transforming and forming products from worship flowers

The process of transforming and forming products from worship flowers that is suitable for further development into souvenir following the experiment. In the experiment to transform worship flowers using the drying method suggested that after the marigolds as the worship flowers were completely dried taking about 7 days, they were brought to the forming process which can be done for both the dried flowers and the dried flowers powder. Formula 3 was found to be the ideal formula with a ratio of glue powder: water: dried flowers as 10: 5: 1. The resulting sample workpiece had its surface clearly showing the features, uniqueness, and beauty of the worship flowers.

3. Proposing a guide to developing souvenir products from worship flowers in the patterns of stucco decorated on Prang of Wat Chulamani in Phitsanulok Province

Study results suggested the application of SCAMPER technique to design Hong Karb Mala and floral patterns as in the stucco decoration on Prang of Wat Chulamani in Phitsanulok Province, providing the designs that can be developed into souvenir products. Considering the 3 sketches of patterns, Sketch 2 was found to be suitable for further developing into souvenir products in harmony with the worship flowers, which included 2 types as decorative picture frame (Figure 13) and keychains (Figure 14).

Figure 13 Prototype of souvenir picture frame with patterns of stucco decorated on Prang, made from worship flowers at Wat Chulamani

Figure 14 Prototype of souvenir keychains with patterns of stucco decorated on Prang, made from worship flowers at Wat Chulamani

Discussion

The Prang of Wat Chulamani in Phitsanulok Province was decorated with a distinctive and unique pattern of stucco namely Hong Karb Mala (Swan catching bouquet). According to Trakul Roykaew (2002), such a swan pattern had the beauty in Thai style better than those in other temples, and without repetition of the patterns, showing the artists' independent ideas. Two forms of swan patterns were found which agreed with Santi Leksukhum (1996) stated that the swan patterns were characterized by 2 different appearances. One is the swan pattern created by skilled craftsmen, that had proportionate size, nicely extended neck, continuation of the pattern in rhythm and dimensional deep-relief. Another one, assumed to be the swan pattern created by apprentice craftsmen, had a relatively long neck, and the comb, wings, and tail made by scratching cement to create patterns that differed from the first one.

The process of transforming and forming products from worship flowers applied the 4Rs principles that conform to the conceptual framework of a study based on the Eco-Design principles as mentioned by Thapanat Kaewpan, Sarawut Itsaranuwat, and Jariya Plangnok (2020), comprising Reduce, Reuse, and Recycle. The worship flowers or marigolds as the garlands offered by Buddhists at Wat Chulamani in Phitsanulok Province were brought into the production process for their reuse, including the principle of repair by using an experimental process to obtain a product that is sturdy and durable to extend its lifespan.

Product development as souvenirs in the patterns of swan stucco decorated on Prang, made from worship flowers at Wat Chulamani in Phitsanulok Province applied the local identity in combination with the SCAMPER concept to design souvenir products. In this way, the products not only represent the local distinctive identity but also tell the stories about worship flowers as materials used in the production. Atikhun Layraman et al. (2021) stated that the design of local souvenir products needs to take-into account the precious cultural identity of each locality in order to create a charming and contemporary product that tell the story and history of a particular product. Technology may be used to create a prototype and help to make the product look contemporary and attractive.

Recommendations

1. Stucco sculptures decorated on Prang of Wat Chulamani in Phitsanulok Province are in many other beautiful and interesting patterns including Hong Karb Mala created by apprentice craftsman, Chinese curved frame, Fueng Uba, Phun Prueksa, for example. Designers or interested persons can apply these patterns in their designs of jewellery or other types of products as well.

2. The process of transforming and forming products from worship flowers can be experimented with other natural materials within the locality as well as other types of waste materials.

3. The model souvenir product is one approach to product development that can be incorporated into the study of market and consumer trends or the design trends each year for commercial production.

References

Phairat Sookkharot. (2024). *Rowing a boat*. Retrieved 10 August2023 from https://www.facebook.com/phairat.sookkharot

Praima Israsena Na Ayudhya. Chujit Treerattanaphan. (2019). *Design thinking : learning by doing*. Thailand Creative and Design Center.

Atikhun, L., Chawarinth, S., Suprapa, S., Naphatsanan, V., & Ananya, R. (2021). Development of Souvenir Products Reflecting the Identity of the Tourist Attraction. *Journal of MCU Social Science Review, Mahachulalongkornrajavidyalaya University*, 10(4), 306-318.

Chanatip, S. (2021). *Jewelry Design Project Inspired from the Art Giving Flowers as Gift*. M.F.A., Silpakorn University, Bangkok.

Nitchakamon, B. (2023). Flowers from Nature Might not Always be Environmentally Friendly. Retrieved from https://urbancreature.co/flower-waste/

Phitsanulok Provincial Local Administration Office. (2021). The Amount of Solid Waste in Phitsanulok Province, 2021 (Oct. 2020-June 2021). Retrieved from https://data.go.th/th/dataset/2021-2020. -2021

Santi, L. (1996). *Prang and Stucco Decorations at Wat Chulamani, Phitsanulok.* Nakhon Pathom: Research and Development Institute. Silpakorn University.

Thapanat, K., Sarawut, I., & Jariya, P. (2020). Principles and Concepts of Product Design. *Journal of Humanities and Social Sciences, Surindra Rajabhat University,* 22(2), 161-182.

Thipawan, T. (2013). A Wisdom in Creating the Lan Na Pollen Buddha Images for the Construction of Contemporary Buddha Images. *Silpakorn University Journal, Thai Edition*, 33(2), 107-134.

Trakul, R. (2002). *A study of Concept, Theory, and Technique to Conserve Stucco Decoration on Buildings: A Case study of Wat Chulamani, Mueang District, Phitsanulok Province.* B.A., Silpakorn University, Bangkok.

Quality of Mud Fermented Natural Dyeing of Water Hyacinth Strands

Saran Hema[1*] and Nirat Soodsang[2]

[1]Innovation and Technology Transfer Institute, University of Phayao, Phayao, Thailand
[2]Faculty of Architecture, Art and Design, Naresuan University, Phitsanulok, Thailand
[*]E-mail: saranh66@nu.ac.th; nirats@nu.ac.th

Received: Feb 11, 2024, Revised: Apr 19, 2024, Accepted; May 11 2024, Published online: June 30, 2024

Abstract

The objectives of this study were 1) to test the mud fermented natural dyeing process of water hyacinth strands; 2) to examine the quality of colour adhesion of water hyacinth strands after fermented natural dyeing. The study method consists of 3 steps. Step 1: Preparing water hyacinth strands as raw material by taking 2 forms of water hyacinth strands including round strands and spiral strands from the same source of raw materials to be used as test sample materials. Step 2: Proceeding fermented natural dyeing of water hyacinth strands using 4 kinds of natural materials: mud, dried eucalyptus bark, fresh mango leaves, and fresh avocado leaves; applying cold dyeing process or fermented dyeing process for a period of 7 days at room temperature; randomly collecting samples every day, cleaning and drying them in a hot air oven at 40°C for 8 hours. Step 3: Measuring the colours of the samples with a Colourimeter (CIE lab) and recording their colours each day along with the use of systematic photographing techniques to compare colour differences after dyeing. The study results reported the quality of fermented natural dyeing of water hyacinth strands with the 4 natural materials using cold dyeing or fermentation dyeing for a period of 7 days that increased fermentation duration resulted in different colours. Fermented in mud, the round strands showed the values of (L*) in a range of 54.58 - 57.10, whereas the spiral strands showed the values of (L*) in a range of 48.10 - 42.60, with (+a*) indicating red, and (+b*) indicating yellow. Fermented with dye from dried eucalyptus bark, the round strands showed the values of (L*) in a range of 64.15 - 58.10, whereas the spiral strands showed the values of (L*) in a range of 59.51 -. 48.40, with (+a*) indicating red and (+b*) indicating yellow. Fermented with the dye of fresh mango leaves, the round strands showed the values of (L*) in a range of 64.82 - 49.28, whereas the spiral strands showed the values of (L*) in a range of 44.40 - 38.91, with (+a*) indicating red and (+b*) indicating yellow. Fermented with dye from fresh avocado leaves, the round strands showed the values of (L*) in a range of 64.28 - 64.20, whereas the spiral threads showed the value of (L*) in a range of 55.23 - 52.03, with (+a*) indicating red and (+b*) indicating yellow.

Keywords: Fermented natural dyeing, Mud fermentation, Round strands, Spiral strands

Introduction

Textile industry is now one among the largest scale industries in the world. As the production process becomes easier and moves along with rapidly changing trends, in many cases, used handicrafts were discarded as waste, thus causing more severe environmental problems. The industry emits more pollutions, uses larger amount of water than any other sector. It regularly releases toxic chemicals, and also consumes a huge volume of energy. Currently, most handicrafts are not biodegradable. This has led to the awareness of the need to develop products that take-into account the impact on people, society and the environment. This study explores techniques and methods make use of natural materials. Among them is the use of natural dyes as a potential substitute to synthetic dyes in industrial and handicraft processes. Today, in small and medium-sized enterprises, the production process still relies on chemical dyes for product dyeing. Synthetic dyes produced from chemical reactions that offer colour fastness are still used in fabric dyeing and silk dyeing. These dyes are easy to use and cost less that other dyes. Research results on synthetic dyeing processes using other materials were found to contain heavy metals which contaminate the environment are carcinogenic and toxic to consumers, whether in the form of pure elements, organic compounds, or inorganic compounds (Department of Science Service Journal, 2018). These elements are hazardous and have been linked to various diseases of the respiratory system, as well as a number of skin diseases. Accumulated chemicals used in the product dyeing process, may endanger the safety of workers involved in the dying processes (Rath Chompuphan and Chanakarn Ruangnarong, 2023). Residues of chemically contaminated wastewater in the environment may have negative effects on consumers if this water is fed into the local communal water supply.

In the past, dyeing utilized natural dyes extracted from locally available plants to dye various products according to local knowledge that has been passed down from generation to generation. The raw materials are processed to extract the colour which would be used make natural dyes. The water used comes from many sources, for example, natural dyes may be processed from fermented mud. Natural dyes may also be extracted from plants such as dried eucalyptus bark, fresh mango leaves, fresh avocado leaves, etc. These materials give the naturally dyed products a unique colour appearance. Other than the colour properties that make these products stand out, natural dyes do no harm to users and leave no residues in the environment. The current trend of natural dye products shows increasing popularity and demand among consumers since they have turned to focus more on their personal health and the environment. Natural materials or natural dye products are thus able to satisfy consumer needs and reduce concerns about chemicals used in the production process.

Recognizing the importance of using environmentally-friendly processes of product development, the researcher therefore conducted this study to explore the use of natural raw materials to develop natural dyes so as to produce high value wickerwork products without using chemicals that may be harmful to the environment and consumers. A cold dyeing process or a natural fermented dyeing process were chosen as dyeing the method. It utilizes plants and natural materials without applying heat but relying on the natural properties of pigments from natural chemical reactions to help with the colour adhesion of water hyacinth strands. This could guide the improvement of distinctiveness of water hyacinth dyeing and maximize the use of local raw materials that provide uniqueness to water hyacinth wickerwork products.

Objectives

1. To test the natural dyeing process of mud-fermentation of water hyacinth strands.
2. To examine the quality of colour adhesion of water hyacinth stands after the process of fermented natural dyeing.

Methodology

The research method to study the relevant research objectives, employed an experimental approach aimed at examining the quality of mud fermented natural dyeing of water hyacinth strands, following the procedures described below.

Step 1: Preparing material of water hyacinth strands

Step 2: Proceeding fermented natural dyeing of water hyacinth strands

2.1 Mud-fermented natural dying

2.2 Fermented natural dyeing with dried eucalyptus bark, fresh mango leaves, and fresh avocado leaves.

Step 3: Testing the colour values of water hyacinth strands

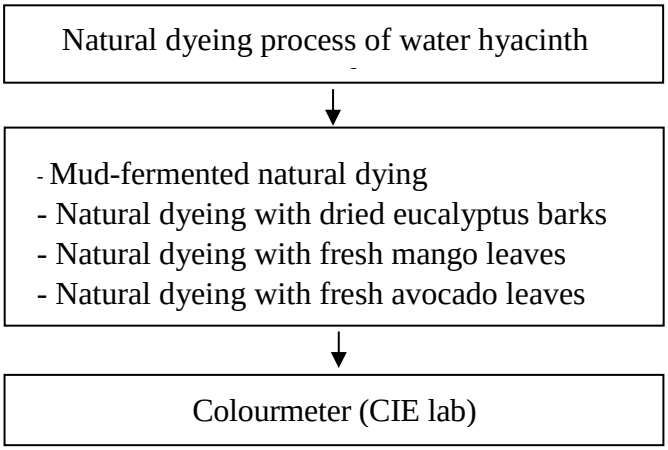


Figure 1 Conceptual framework of research method

Step 1 Preparing raw materials

Take water hyacinth stands in 2 forms of 1) round strands, and 2) spiral strands, from the same source of raw materials, and cut them into lengths of about 20 cm long to be used as material samples of water hyacinth strands in the experiment of fermented natural dyeing.

Figure 2 Preparing raw materials of water hyacinth in 2 forms:
1) Round strands, and 2) Spiral strands

Step 2: Fermented natural dyeing of water hyacinth strands

2.1 Mud-fermented natural dyeing

Prepare mud liquid for fermentation by bringing the mud to sun-dry, remove weeds from the mud, and finely grind the mud. Dissolve the finely ground mud in water at a ratio of 3 kg of ground mud to 3 liters of water and filter it with screen net to separate mud from unwanted organic particles.

Figure 3 Preparing mud liquid for fermentation

The process of mud-fermented natural dyeing was carried out by bringing the 2 forms of water hyacinth strands, 1) round strands and 2) spiral strands to ferment in 6 litres of mud liquid for 7 days at room temperature. Randomly collect the samples every day, wash and clean them and bring them to oven-dry using a hot air oven at the temperature of 40°C for 8 hours. After that, measure the colour values using a Colourmetre (CIE lab), and record the results each day along with using the systematic photographing technique to compare colour differences after dyeing.

2.2 Fermented natural dyeing with dried eucalyptus bark, fresh mango leaves, and fresh avocado leaves.

Figure 4 Dried Eucalyptus Bark

Bring both forms of water hyacinth strands i.e. 1) round strands and 2) spiral strands to dye in natural dye water made from 1) dried eucalyptus bark, 2) fresh mango leaves, and 3) fresh avocado leaves. Roughly cut or chop the materials until you have 300 g and soak them in 3 litres of water and leave for 2 hours. After that, bring them to a boil at 100°C for 1 hour, and filter the natural dye water with a white linen cloth. Add 50 g of alum and 50 g of salt into the dye water. Dye water hyacinth strands by a cold dyeing process or using the fermentation dyeing process for a period of 7 days at room temperature. Randomly collect the samples every day, wash and clean them and oven-dry using a hot air oven at 40°C for 8 hours. After that, measure the colour values using a Colourmetre (CIE lab), record the results each day along with using a systematic photographing technique to compare colour differences after dyeing.

Figure 5 Fermented natural dyeing with dried eucalyptus barks

Figure 6 Fermented natural dying with fresh mango leaves

Figure 7 Fermented natural dyeing with fresh avocado leaves

Step 3: Testing the colour values of water hyacinth strands

Measuring colour values with a Colourmetre (CIE lab) is to use the system to measure colours or characterize colours instead of relying on using human vision because colour perception is based on individual experience with different interpretations. It has often been found that each person describes the colour of the same thing differently. Therefore, colour measurements have been developed to provide numeric values consistently identifying colour differences without relying on human experience or thought to measure colours. Colour values are characterized as follows:

Colourmetre CIE L* a* b*)	Interpretation
L* Axis indicates lightness	L* = 0 means blackness L* = 100 means whiteness
a* Axis represents redness – greenness	(-a*) means greenness (+a*) means redness
b* Axis represents yellowness – blueness	(-b*) means blueness (+b*) means yellowness

Results

The result reported the quality of fermented natural dyeing of water hyacinth strands using different kinds of natural raw materials including 1) mud, 2) dried eucalyptus barks, 3) fresh mango leaves, and 4) fresh avocado leaves, through a natural dyeing process of cold dyeing or fermentation dyeing for a period of 7 days. The test with colourmeter (CIE L* a* b*) provided colour values of different types of natural materials and the quality of colour adhesion on 2 forms of water hyacinth strands: 1) round strands and 2) spiral strands as shown in Table 1.

Table 1 Colour values of round and spiral strands of water hyacinth using mud-fermented natural dyeing

Number of Dyeing day	Appeared Colour	Colour Value Water Hyacinth Strands (Round)			Appeared Colour	Colour Value Water Hyacinth Strands (Spiral)		
		L*	a*	b*		L*	a*	b*
Control		$88.20^{a}\pm 2.51$	$9.04^{a}\pm 2.13$	$30.50^{a}\pm 0.63$		$66.26^{a}\pm 1.84$	$9.20^{a}\pm 0.93$	$24.13^{a}\pm 3.06$
Day1		$54.58^{bc}\pm 2.51$	$1.10^{c}\pm 0.78$	$14.44^{d}\pm 0.79$		$48.10^{bc}\pm 0.92$	$2.23^{e}\pm 0.38$	$11.70^{d}\pm 0.61$
Day2		$53.82^{bc}\pm 2.30$	$2.10^{b}\pm 0.81$	$15.20^{d}\pm 2.43$		$46.20^{cd}\pm 1.12$	$2.70^{de}\pm 0.29$	$12.50^{cd}\pm 1.00$
Day3		$50.51^{c}\pm 1.45$	$2.20^{b}\pm 0.33$	$13.71^{d}\pm 1.83$		$46.60^{cd}\pm 1.82$	$4.10^{b}\pm 0.23$	$16.20^{b}\pm 1.39$
Day4		$51.74^{c}\pm 2.74$	$2.64^{b}\pm 0.44$	$15.60^{d}\pm 0.17$		$44.70^{de}\pm 1.85$	$3.70^{bc}\pm 0.38$	$14.70^{bcd}\pm 0.90$
Day5		$54.10^{bc}\pm 1.86$	$2.98^{b}\pm 0.56$	$16.10^{cd}\pm 1.08$		$50.20^{b}\pm 1.11$	$2.90^{cde}\pm 0.34$	$15.10^{bc}\pm 0.95$
Day6		$56.20^{b}\pm 2.85$	$2.90^{b}\pm 0.87$	$18.23^{bc}\pm 1.78$		$48.62^{bc}\pm 1.25$	$3.20^{cd}\pm 0.51$	$15.60^{bc}\pm 1.05$
Day7		$57.10^{b}\pm 1.10$	$2.62^{b}\pm 0.52$	$18.70^{b}\pm 0.33$		$42.60^{e}\pm 1.72$	$3.22^{cd}\pm 0.27$	$12.64^{cd}\pm 2.40$

Remark: Different letters shown vertically indicate statistically significant difference at a confidence level of 95%

Table 1 reports the round and spiral water hyacinth strands in mud-fermented natural dyeing for 7 days, suggesting that increased time of mud-fermentation of the strands resulted in significant reduction of lightness (L*) with day 4 and day 5 showing the lowest (L*) as 50.51 and 51.74, respectively. As for the value of redness or greenness (a*), the increased time had no significant effect on (a*). The value of yellowness or blueness (b*) was found to be highest as 18.70 on day 7, whereas (b*) were lowest but not statistically different during day 1 to day 4, equaling 14.44, 15.20, 13.71 and 15.60, respectively.

The spiral strands fermented in mud for an increased period of time resulted in a statistically significant decrease in brightness (L*), with the lowest (L*) of 42.60 on day 7. The value of redness or greenness (a*) was found to be lowest as 2.23 on day 1. As for the value of yellowness or blueness (b*), increased fermentation time had no statistically significant effect on (b*).

Table 2 Colour values of round and spiral water hyacinth strands using fermented natural dying with dried eucalyptus barks

Number of Fermentation Day	Appeared Colour	Colour Value – Water Hyacinth Strands (Round)			Appeared Colour	Colour Value – Water Hyacinth Strands (Spiral)		
		L*	a*	b*		L*	a*	b*
Control		$88.20^{a}\pm$ 2.51	$9.04^{a}\pm$ 2.13	$30.50^{a}\pm$ 0.63		$66.26^{a}\pm$ 1.84	$9.20^{a}\pm$ 0.93	$24.13^{a}\pm$ 3.06
Day1		$64.15^{cd}\pm$ 0.97	$9.64^{bc}\pm$ 0.14	$28.63^{abc}\pm$ 0.09		$59.51^{b}\pm$ 1.45	$11.42^{c}\pm$ 0.33	$27.91^{cd}\pm$ 0.51
Day2		$68.73^{b}\pm$ 1.17	$7.19^{d}\pm$ 1.21	$28.08^{bc}\pm$ 1.55		$59.48^{b}\pm$ 0.30	$10.88^{c}\pm$ 1.06	$27.94^{cd}\pm$ 1.89
Day3		$62.65^{d}\pm$ 0.51	$10.94^{bc}\pm$ 1.52	$28.16^{bc}\pm$ 1.73		$59.27^{b}\pm$ 0.94	$12.01^{bc}\pm$ 0.23	$29.75^{ab}\pm$ 0.69
Day4		$64.96^{c}\pm$ 0.12	$11.22^{ab}\pm$ 0.49	$29.89^{ab}\pm$ 1.01		$58.31^{b}\pm$ 0.48	$11.14^{c}\pm$ 0.08	$28.69^{bc}\pm$ 0.30
Day5		$62.72^{d}\pm$ 1.21	$9.33^{bc}\pm$ 0.95	$26.75^{c}\pm$ 1.40		$45.32^{d}\pm$ 0.44	$14.62^{a}\pm$ 0.58	$25.43^{e}\pm$ 0.82
Day6		$53.40^{f}\pm$ 0.57	$13.15^{a}\pm$ 0.14	$27.48^{c}\pm$ 0.22		$46.48^{cd}\pm$ 0.26	$13.47^{ab}\pm$ 0.47	$25.75^{e}\pm$ 0.46
Day7		$58.10^{e}\pm$ 0.25	$11.12^{bc}\pm$ 0.60	$29.73^{ab}\pm$ 1.23		$48.40^{c}\pm$ 0.52	$13.93^{a}\pm$ 0.41	$26.93^{e}\pm$ 0.75

Remark: Different letters shown vertically indicate statistically significant difference at a confidence level of 95%

Table 2 reports the round and spiral water hyacinth strands in fermented natural dyeing with dried eucalyptus barks for a period of 7 days, suggesting that increased time had a significant effect on decreased brightness (L*) on day 6 and day 7, with the lowest (L*) of 53.40 and 58.10, respectively. The value of redness or greenness (a*) on day 6 was highest as 13.15. The values of yellowness or blueness (b*) on day 5 and day 6 were lowest but not statistically different, with (b*) of 26.75 and 27.48, respectively.

The spiral strands in fermented natural dyeing with dried eucalyptus barks for increased time resulted in a statistically significant decrease in brightness (L*). On day 5, (L*) value was lowest as 45.32, and during day 1 to day 4, (L*) values were not significantly different, equaling 59.51, 59.48, 59.27, and 58.31, respectively on day 1, day 2, day 3, and day 4. The value of redness or greenness (a*) on day 5 was highest as 14.62, and during day 1 to day 4, (a*) values were not significantly different, equaling 11.42, 10.88, 12.01, and 11.14, respectively on day 1, day 2, day 3, and day 4. As for the value of yellowness or blueness (b*), increased time had a statistically significant effect on (b*) value. On days 5, day 6, and day 7, (b*) values were found lowest as 25.43., 25.75, and 26.93 respectively.

Table 3 Colour values of round and spiral water hyacinth strands using fermented natural dying with fresh mangoes leaves

Number of Fermentation Day	Appeared colour	Colour Value Water Hyacinth Strands (Round)			Appeared Colour	Colour Value Water Hyacinth Strands (Spiral)		
		L*	a*	b*		L*	a*	b*
Control		$88.20^{a}\pm 2.51$	$9.04^{a}\pm 2.13$	$30.50^{a}\pm 0.63$		$66.26^{a}\pm 1.84$	$9.20^{a}\pm 0.93$	$24.13^{a}\pm 3.06$
Day1		$64.82^{b}\pm 1.87$	$12.28^{c}\pm 1.50$	$32.95^{b}\pm 0.38$		$44.40^{b}\pm 1.66$	$8.59^{d}\pm 0.08$	$20.81^{de}\pm 0.27$
Day2		$60.48^{c}\pm 1.44$	$14.27^{bc}\pm 1.18$	$33.63^{ab}\pm 0.44$		$42.80^{bc}\pm 0.46$	$11.43^{ab}\pm 0.63$	$23.01^{bcd}\pm 1.96$
Day3		$53.34^{d}\pm 0.68$	$16.17^{ab}\pm 0.83$	$29.83^{c}\pm 1.55$		$40.89^{cd}\pm 0.49$	$12.75^{a}\pm 0.13$	$24.58^{bc}\pm 0.59$
Day4		$65.47^{b}\pm 0.78$	$12.97^{c}\pm 0.92$	$35.04^{a}\pm 1.03$		$40.78^{cd}\pm 2.55$	$12.99^{a}\pm 0.91$	$25.24^{b}\pm 2.05$
Day5		$51.89^{de}\pm 1.02$	$17.66^{a}\pm 1.29$	$33.04^{b}\pm 0.91$		$39.78^{d}\pm 0.41$	$11.51^{ab}\pm 0.74$	$22.15^{cd}\pm 1.71$
Day6		$50.48^{e}\pm 1.41$	$16.34^{ab}\pm 0.22$	$30.50^{c}\pm 1.58$		$36.22^{e}\pm 1.07$	$10.49^{bc}\pm 0.35$	$19.08^{e}\pm 1.35$
Day7		$49.28^{e}\pm 0.99$	$15.52^{ab}\pm 1.84$	$29.57^{c}\pm 0.65$		$38.91^{d}\pm 1.46$	$11.67^{ab}\pm 0.48$	$21.68^{d}\pm 0.97$

Remark: Different letters shown vertically indicate statistically significant difference at a confidence level of 95%

Table 3 shows that the round and spiral water hyacinth threads in fermented natural dyeing with fresh mango leaves for a period of 7 days, suggesting that fermentation for an increased period of time resulted in a significant decrease in brightness (L*), with lowest (L*) of 50.48 and 49.28 on day 6 and day 7, respectively. For the redness or greenness value (a*), increased time had no statistically significant effect on (a*). For the value of yellowness or blueness (b*), increased time had no statistically significant effect on (b*), with (b*) was lowest as 30.50 and 29.57 on day 6 and day 7, respectively.

Spiral water hyacinth strands in fermented natural dyeing with fresh mango leaves for increased time resulted in a statistical significant decrease in brightness (L*), with the lowest (L*) of 36.22 on day 6. For the value of redness or greenness (a*), day 3 and day 4 were reported with the highest (a*) but not statistically different, equaling 12.75 and 12.99, respectively. For the value of yellowness or blueness (b*), it was lowest as 19.08 on day 6

Table 4 Colour values of round and spiral water hyacinth strands using fermented natural dying with fresh avocado leaves

Number of Fermentation Day	Appeared Colour	Colour Value – Water Hyacinth Strands (Round)			Appeared Colour	Colour Value – Water Hyacinth Strands (Spiral)		
		L*	a*	b*		L*	a*	b*
Control		$88.20^{a}\pm 2.51$	$9.04^{a}\pm 2.13$	$30.50^{a}\pm 0.63$		$66.26^{a}\pm 1.84$	$9.20^{a}\pm 0.93$	$24.13^{a}\pm 3.06$
Day1		$64.28^{d}\pm 1.00$	$13.77^{a}\pm 1.32$	$34.55^{b}\pm 1.18$		$55.23^{b}\pm 1.76$	$8.02^{c}\pm 0.52$	$27.13^{bc}\pm 3.59$
Day2		$72.32^{b}\pm 1.89$	$8.85^{bcd}\pm 0.36$	$33.69^{bc}\pm 0.95$		$50.15^{cd}\pm 0.18$	$8.79^{c}\pm 0.03$	$24.19^{c}\pm 0.06$
Day3		$68.11^{c}\pm 0.71$	$6.72^{d}\pm 0.63$	$33.75^{bc}\pm 1.39$		$49.97^{cd}\pm 0.09$	$11.64^{a}\pm 0.11$	$32.46^{a}\pm 0.11$
Day4		$67.41^{c}\pm 0.46$	$8.09^{cd}\pm 0.58$	$31.01^{cd}\pm 0.43$		$51.16^{bcd}\pm 0.81$	$9.77^{bc}\pm 0.54$	$27.20^{bc}\pm 0.10$
Day5		$66.12^{cd}\pm 1.57$	$7.51^{cd}\pm 1.16$	$34.53^{b}\pm 1.67$		$51.42^{bc}\pm 1.12$	$9.77^{bc}\pm 0.61$	$30.15^{ab}\pm 1.01$
Day6		$66.33^{cd}\pm 1.15$	$10.24^{bc}\pm 1.82$	$33.63^{bc}\pm 0.82$		$47.86^{cd}\pm 1.10$	$10.92^{ab}\pm 1.14$	$27.42^{bc}\pm 3.61$
Day7		$64.20^{d}\pm 0.97$	$11.36^{ab}\pm 2.36$	$39.63^{a}\pm 3.14$		$52.03^{bc}\pm 0.12$	$10.94^{ab}\pm 0.14$	$33.29^{a}\pm 0.08$

Remark: Different letters shown vertically indicate statistically significant difference at a confidence level of 95%

Table 4 reports the round and spiral water hyacinth strands in fermented natural dyeing with fresh avocado leaves for a period of 7 days, suggesting that increased time had no statistically significant effect on (L*). The value of redness or greenness (a*) was highest as 13.77 on day 1, and the value of yellowness or blueness (b*), was highest as 39.63 on day 7.

Spiral water hyacinth strands in fermented natural dyeing with fresh avocado leaves for increased time had no statistically significant effect on brightness (L*). The value of redness or greenness (a*) was found to be highest on day 6 and day 7, equaling 10.92 and 10.94, respectively. The value of yellowness or blueness (b*) was found to be lowest on day 2, equaling 24.19.

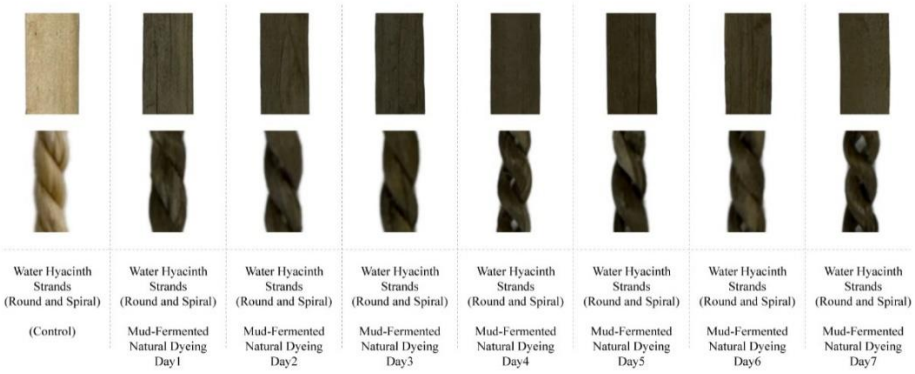


Figure 8 Colours of round and spiral water hyacinth strands in mud-fermented natural dyeing

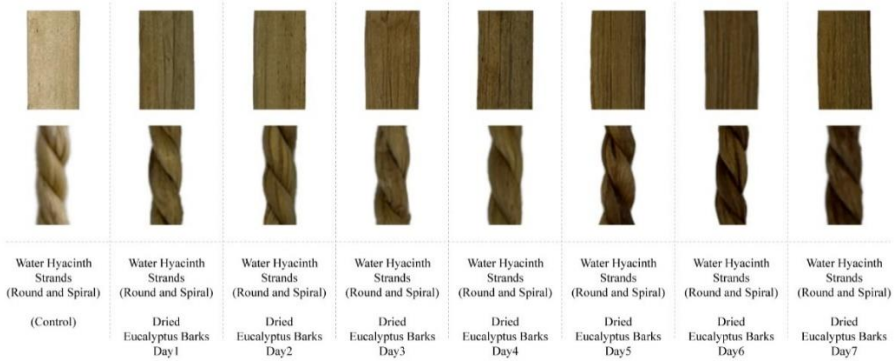


Figure 9 Colours of round and spiral water hyacinth strands in fermented natural dyeing with dried eucalyptus barks

Figure 10 Colours of round and spiral water hyacinth strands in fermented natural dyeing with fresh mango leaves

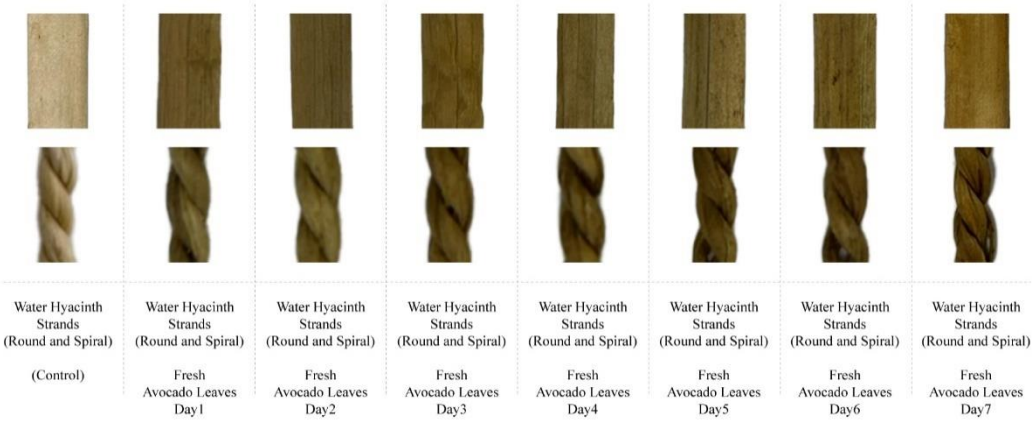


Figure 11 Colours of round and spiral water hyacinth strands in fermented natural dyeing with fresh avocado leaves

Conclusion

The quality of natural dyeing of water hyacinth strands with different natural materials and plants including mud, dried eucalyptus bark, fresh mango leaves, and fresh avocado leaves through the cold dyeing or fermentation dyeing process for a period of 7 days is reported with increased time resulting in differences in the colours. Using mud-fermented natural dying, the round strands had (L*) in a range of 54.58 - 57.10, whereas the spiral strands had (L*) in a range of 48.10 - 42.60, with (+a*) indicating red and (+b*) indicating yellow. Using fermented natural dyeing with dried eucalyptus bark, the round strands had (L*) in a range of 64.15 - 58.10, whereas the spiral strands had (L*) in a range of 59.51 -. 48.40, with (+a*) indicating red and (+b*) indicating yellow. Using fermented natural dyeing with fresh mango leaves, the round strands (L*) fell within the range of between 64.82 - 49.28, whereas the spiral strands had (L*) in a range of 44.40 - 38.91, with (+a*) indicating red and (+b*) indicating yellow. Using fermented natural dyeing with fresh avocado leaves, the round strands (L*) fell within a range of 64.28 - 64.20, and the spiral strands had (L*) in a range of 55.23 - 52.03, with (+a*) indicating red and (+b*) indicating yellow.

Recommendations

1. Recommendations from research

1.1 Research results suggested physical characteristics of water hyacinth that composes of interior large angular pores and cellulose fibers. The exterior surface of water hyacinth being conditioned for wickerwork was not smooth with uneven light and dark brown colours, naturally coated with wax, making it difficult for the adhesion of natural colour.

1.2 Natural dyeing of water hyacinth strands with natural raw material and different kinds of plant including mud fermentation, fermented dyeing with dried eucalyptus barks, fresh mango leaves, and fresh avocado leaves using the cold dyeing process or fermentation dyeing for a period of 7 days resulted in good colour adhesion but uneven due to different physical characteristics of water hyacinth strands.

1.3 Mud fermented natural dyeing other than being natural mordant, it affects the increased intensity of colour by the duration of fermentation as a result of chemical reaction between the mud and the material. The results showed that increased duration had a statistically significant effect on the decrease in brightness (L*).

2. Recommendations for further research

2.1 In the production, it is recommended to select raw materials of water hyacinth strands with a similar outer surface so as to increase the efficiency of colour adhesion as well as an even and consistent appearance.

2.2 Other types of mordant, natural raw materials, and plants should be examined to compare different colour values and the efficiency of colour adhesion.

References

Songkoon Chantachon. (2015). *Mud-Dyed Silk: The Development of Silk Production Knowledge of Communities in the Northeastern Thailand.* Journal of Cultural Research, 2(2), 129-139.

Suphachai Jindawutthikul. (2018). *Dyeing Reed Threads with Natural Dyes.* Journal of the Department of Science Service, Department of Science Service, 1(1), 21-23.

Anoda Ratchawet and Jesadaphon Kittipattanawit. (2018). *The Value Added of Dyed Cotton Yarns by Phuclone Mud from Mae Hong Son* Chiang Mai Rajabhat University. Chiang Mai.

Patcharaporn Pimchan. (2019). *The Enhancing Color Fastness and Color Strength of Natural Pigment for Cyperus Papyrus L. Fibril Dyeing.* Koch Cha Sarn Journal of Science, 2(2), 61-72.

Somchaya Sritham et al. (2020). *Diversity of Tree Species and Utilization of Natural Dyeing: A Case Sudy of Community Forest in Surin Province.* Agriculture and Technology Journal, 1(2), 17-32.

Khanitha Jitchinakul. (2021). *Mud Fermented Cloth: From Local Wisdom to Geographical Indication (GI) Products.* MCU Journal of Social Science Review Mahachulalong kornrajavidyalaya, 1(1), 1-17.

Chuleekant Sainate (2021). *Dyeing Reeds and Stolon with Natural Dyes.* Buriram Rajabhat University, Buriram.

Buran Phansawan. (2022). *A Complete Report of the Project on Innovation of Natural Color Powder from the Group of Mae Ing Shibori and Tung Mok Model.* University of Phayao. Phayao.

Natural Dyeing Steps. Retrieved on 28 March 2024, from http://www.sptn.dss.go.th/otopinfo/index.php/en/ home/26-interesting-articles/124-2017-03-28-09-03-58

International Journal of Architecture, Art and Design (IJAD), Naresuan University

Illustration Design of Tarot Cards from Thai Literature

Apiwat Puntatong[1*] Kewalin Chaiyasang[2] and Thanachonk Pingmuang[3]

[1-3]School of Information and Communication Technology, Computer Graphics and Multimedia, University of Phayao

*E-mail: Apiwat.puntatong@gmail.com; Kewslin@gmail.com; numven2544@gmail.com

Received: Apr 11, 2024, Revised: Apr 23, 2024, Accepted; May 21, 2024, Published online: June 30, 2024

Abstract

The purpose of this study was three-fold: 1) to explore the ideal patterns of tarot card illustrations from Thai literature; 2) to design and create tarot card illustrations from Thai literature by the forms of representation and congruence with the original tarot cards suit; and 3) to examine the efficiency of tarot card illustrations from Thai literature by collecting data from relevant documents and research works, and developing the patterns of illustrations for 22 tarot cards in the Major Arcana to convey the meaning and to be congruent with the original tarot cards suit, applying the concept of Thai literature. The illustration designs were reviewed and evaluated by 3 specialists to find out the ideal illustrations which were then printed on appropriate print material. For efficiency evaluation of tarot card illustrations from Thai literature, the research sample included 50 people who were interested in tarot card illustration design. The evaluation focused on 3 aspects comprising 1) Material used was appropriate for functioning, 2) Design principles, and 3) Representation of illustrations. The result of efficiency evaluation of tarot card illustrations from Thai literature on the 3 aspects reported the overall mean of 4.00, suggesting a very high level of propriety.

Keywords: Design / Illustration / Tarot cards / Thai literature

Introduction

Tarot cards, also known as “gypsy cards,” are used as a tool to predict people's past, present, and future by flipping the card and reading the prediction as appeared on the card that contains no letters but an art illustration. The origins of tarot cards are thought to have come from the Gypsies. The word "Gypsy" refers to a nomadic people assumed to have originated in the Indian subcontinent. It is believed that they may be Dravidian, another group of people who passed on their civilization to the Babylonians before migrating and became scattered across Europe and central Asia, with some populations settling in the land of Egypt and parts of Europe. The word "Gypsy" thus emerged from the presence of this group of people in England at the beginning of the 16th century and was recorded as Egyptian immigrants. When the Gypsies came to have role in Europe during the time the church was very powerful, the early prediction was done using only a crystal ball along with psychology. The Church saw it as unacceptable and labeled the Gypsies as wizard or shaman which was considered, at that time, to be evil, leading to the Gypsies inventing cards or playing cards to substitute for their crystal balls. It was not accepted at once until a gypsy woman used her cards to make predictions for King Charles VI of France. This led to tarot cards becoming more widely recognized. Later in 1491, a complete tarot deck of 78 cards was produced by an anonymous artist and it was named after the last two rulers. The Sola Busca deck of tarot cards that remained unreleased and seen by very few until a few cards were publicised.

A deck of tarot cards consists of 78 cards consisting of the Major Arcana with 22 cards containing inserted stories of mythology especially Greek gods in some cards; and the Miner Arcana with 56 cards divided into 4 suits of 14 cards each by their symbols including pentacles, discs, coins; cups, chalices; swords; and wands, all are used to represent the four elements as a basis of all things and humans namely earth, water, wind, and fire. The coins suit corresponds to the earth element associated with physical things such as matter or objects, and was often used to predict financial outcomes. The cups suit corresponds to the water element and is often used when talking about abstract ideas such as love and relationships. The swords suit corresponds to the air element representing reason and the logic in the form of decision-making in life. The wands suit corresponds to the fire element, and was commonly used to predict works or driving force of life. Illustrations have been important to humans since ancient times as the letters used by humans today have evolved from paintings. It was assumed that humans had drawn pictures along the cave wall to worship the gods or to record important events. "Illustrations" are the main element to convey meaning, motivating receivers to pay attention and understand the stories and words described in the illustrations. Illustrations stimulate viewer's imagination and awareness as they are able to better explain ideas and stories than presenting stories with letters alone. The properties of an illustration are that it provides a sense of liveliness, movement, enjoyment, and harmony with the story, and can be used to clearly depict the story or meaning (Phadung Prommoon 2004: 92).

Thai literature is a precious literary work with its aesthetic uniqueness. It is part of language learning whereby poets put words in beautiful prose and verses accompanied with contents that help to edify the reader's soul to develop a beautiful mind by those ideas and values embedded in a particular literature. One should thus realize such value of literature (Ratri Preawpanich, 2009: 58). Thai literature is worth studying because “Literature is a language culture that expresses the flourish of the past, and told stories, ways of life, beliefs, thoughts, and courses of people in society (Ingorn Suphanwanich, 2010:196).

With the history and importance of tarot cards and the aesthetic uniqueness of Thai literature, they can be matched to create distinctive illustrations in new forms which can also be utilized to propagate Thai literature to the new generation to become aware of its value. Realizing such importance, the researcher hence carried out this research to guide the development of illustrations so that Thai literature is further recognized and preserved.

Objectives

1. To explore the ideal patterns of tarot card illustrations from Thai literature
2.To design and create tarot cards illustrations from Thai literature based on their representation and congruence with the original tarot cards
3. To examine the efficiency of tarot card illustrations from Thai literature

Scope of the Study

1. In this study, the researcher selected 5 stories of Thai literature namely: Kanha Chalee, Sungthong, Phra Aphai Mani, Traibhum Phraruang, and Inhao to be used for designing illustrations for 22 tarot cards of the Major Arcana.

2. This study focused on exploring the ideal patterns of tarot card illustrations from Thai literature and the suggestions from experts and specialists in arts, and illustrators, which were created by the researcher considering the features, principles of design, and congruence with the original tarot cards.

3. This study aims to create tarot card illustrations from 5 stories of Thai literature comprising Kanha Chalee, Sungthong, Phra Aphai Mani, Traibhum Phraruang, and Inhao according to the experts and specialists in arts and the illustrators from their propriety evaluation of tarot cards on the propriety and congruence with the original tarot cards.

4. The research sample was recruited using a sampling method of people interested in tarot card illustrations design, totally 50 persons.

Methods and Materials

The current research designed tarot card illustrations from Thai literature, and examined the efficiency of tarot card illustrations from Thai literature. The procedures are described below.

1. Documentary study was undertaken through the search from relevant documents and research works including academic papers, research reports, articles, journals, related theses, and internet data sources, and the investigation of relevant stories in Thai literature and mathematical statistics.

2. Designs of tarot card illustrations from Thai literature were developed based on the original illustrations of 22 tarot cards in the Major Arcana. Evaluation was performed by 3 specialists on the propriety of illustration designs by the patterns of tarot cards and the patterns of Thai literature on functioning the communication of meaning and congruence with the original tarot cards.

3. Construction of questionnaire and survey of the efficiency of tarot card illustrations from Thai literature. There were altogether 50 respondents. The obtained data was taken to the analysis; conclusion; presentation in analytical description using statistics including mean and standard deviation; and discussion. Research report was prepared accordingly.

Results

This research on illustration designs of tarot cards from Thai literature provided the following results by its objectives.

Objective 1 To explore the ideal patterns of tarot card illustrations from Thai literature. The investigation of data suggested that a deck of tarot cards consists of totally 78 cards divided into 22 cards in the Major Arcana and 56 cards in the Miner Arcana. This research designed illustrations for 22 cards in the Major Arcana comprising 1. The Fool, 2. The Magician, 3. The High Priestess, 4. The Empress, 5. The Emperor, 6. The Hierophant, 7. The Loves, 8. The Chariot, 9. The Strength, 10. The Hermit, 11. The Wheel of Fortune, 12. The Justice, 13. The Hanged Man, 14. The Death, 15. The Temperance, 16. The Devil, 17. The Tower, 18. The Star, 19. The Moon, 20. The Sun, 21. The Judgement, and 22. The World.

The contents, stories, and characters in Thai literature were studied and used for designing tarot card illustrations from Thai literature including Kanha Chalee, Sungthong, Phra Aphai Mani, Traibhum Phraruang, and Inhao.

Figure 1 The 22 original tarot cards in the Major Arcana

Objective 2 To design and create tarot card illustrations from Thai literature in the forms of representation and congruence with the original tarot cards. The patterns of designs for tarot card illustrations from Thai literature were developed from the original illustrations of 22 tarot cards in the Major Arcana. Evaluation was performed by specialists on the designs of illustrations for their propriety by the patterns of tarot cards and the patterns of literature in functioning communication of meaning and congruence with the original tarot cards.

Figure 2 Patterns of illustration designs for 22 tarot cards in the Major Arcana

Figure 3 New patterns of illustration designs for 22 tarot cards in the Major Arcana

Objective 3 To examine the efficiency of tarot card illustrations from Thai literature. Evaluation results on the efficiency of tarot card illustrations from Thai literature were summarized as follows.

Table 1 Efficiency of tarot card illustrations from Thai literature (n=50)

Evaluation List	Level of Opinion		
	$\bar{x}$	S.D.	Interpretation
1. Material used was appropriate for functioning			
1.1 Material used to create tarot card illustrations was appropriate.	4.10	0.54	Very High
1.2 Materials used to create other components were appropriate.	3.88	0.55	Very High
Total	3.99	0.35	Very High
2. Principles of design			
2.1 Colour	3.66	0.62	Very High
2.2 Proportion	3.70	0.58	Very High
2.3 Unity	3.82	0.52	Very High
2.4 Harmony	4.06	0.51	Very High
2.5 Emphasis	4.30	0.54	Very High
2.6 Balance	3.60	0.57	Very High
Total	3.85	0.22	Very High
3. Representation			
3.1 Illustrations accurately communicate the meaning of stories	4.32	0.55	Very High
3.2 Illustrations contain clear details	3.74	0.59	Very High
3.3 Illustrations are easy to understand, uncomplicated	4.32	0.51	Very High
3.4 Illustrations can stimulate viewers' emotion	3.76	0.51	Very High
3.5 Illustrations are congruent with the originals	4.30	0.54	Very High
3.6 Illustrations are congruent with Thai literature	4.50	0.50	Very High
Total	4.15	0.22	Very High
Grand Total	4.00	0.17	Very High

Table 1 shows mean and standard deviation of evaluation result on the efficiency of tarot card illustrations from Thai literature, ranked by mean score as follows.

Efficiency on material used appropriate for functioning. The material used to create tarot card illustrations was appropriate with a highest mean of 4.10, suggesting a very high level. The overall mean was 3.99, suggesting a very high level.

Efficiency on the principles of design. The emphasis of illustrations was reported most efficiency with mean of 4.30 as a very high level; followed by the harmony of illustrations with mean of 4.06 as a high level; and balance of illustrations with the lowest mean of 3.60 as a very high level. The overall mean was 3.85, suggesting a very high level.

Efficiency on representation of illustrations. The illustrations congruent with Thai literature was reported most efficiency with mean of 4.50, suggesting a very high level; followed by illustrations accurately communicating the meaning of stories, and illustrations easy to understand and uncomplicated both with mean of 4.32 as a very high level; illustrations having clear details reported lowest efficiency with mean of 3.74 as a very high level. The overall mean was 4.15, suggesting a very high level. On the whole, respondents to the evaluation form on the efficiency of tarot card illustrations from Thai literature rated a high level of satisfaction with overall mean of 4.00 for the 3 aspects.

Discussion

Based on the analysis, the design of tarot card illustrations from Thai literature created by collecting data from relevant documents and research works, drawing conclusions, and analyzing to guide the illustration designs, was developed from the original patterns of 22 tarot cards in the Major Arcana. An evaluation was performed by specialists on the designs of illustrations as appropriate for the patterns of tarot cards and the patterns of Thai literature for functioning communication of meaning and congruence with the original illustrations. After that the appropriate illustrations were printed on print material. According to Siri Noodang (2004), illustrations are vital to human communication for a long time. For the use of illustrations, designers should present images that can aimingly communicate and create good understanding to viewers or users. At present, illustrations take part and have an influence in various media. In print media, illustrations came to play a special role for it uses the senses of the eyes.

In this study, the researcher designed a new suit of illustrations of 22 tarot cards in the Major Arcana to convey the meaning and to be congruent with the original suit of tarot cards. As suggested by Thawatchanon Tathaisong (2003), the design with consistency and conveying meaning through visual perception is the process of selecting what is seen as information for perception and is then input into the thoughts through the brain and mind to be interpreted into meaning of things for what they are or what they mean. The tarot card illustrations from Thai literature thus require the design to convey the meaning as in the original cards and to be consistent with the patterns of Thai literature according to the set objectives.

The efficiency evaluation of the designs for tarot card illustrations from Thai literature among the sample group interested in tarot card illustrations from Thai literature suggested that the tarot card illustrations were designed to convey the meaning as in the original forms and were congruent with the patterns of Thai literature. Siri Noodaeng (2004) stated that illustrations need to provide a tool to help visualize the story plot, interpret the meaning or well expand understanding about the story, and create the mood of the story in conformity and relation with the story, corresponded characters, and scenes or places described in the story. The efficiency evaluation was conducted in 3 aspects: 1. Materials used were appropriate for functioning, 2. Principles of design, and 3. Representation of illustrations. The evaluation in overall of the 3 aspects reported mean of 4.00, suggesting a very high level of propriety.

References

Ing-on Suphanwanit. (2010). *Concept development. Bangkok*: Chulalongkorn University.

Phadung Prommoon. (2004). *The Art of Illustration Creation. 2nd Ed.*. Bangkok: Children's Foundation.

Ratri Preawwanich. (2009). *The Jewel of Thai Literature*. Bangkok: Ramkhamhaeng Journal.

Siri Nudang. (2004). *Design for Buddhist Literature Illustration*: Dahajati Jadika. A Thesis for a Master's Degree of Fine Arts, Department of Visual Communication Design, Graduate School, Silpakorn University.

Thawatchanon Tathaisong. (2003). *Principles of Art.* Bangkok: Wadsilp.

INSTRUCTIONS FOR AUTHORS

Instructions for Authors

Manuscripts submitted for publication should be of high academic standard and are accepted on condition that they are contributed solely to the International Journal of Architecture, Art and Design (IJAD). Manuscripts, parts of which have been previously published in conference proceedings, may be accepted if they contain additional material not previously published and not currently under consideration for publication elsewhere. Submission of a multi-authored manuscript implies the consent of all the participating authors. All manuscripts considered for publication will be (double-blind) peer-reviewed by three independent referees from different institutions.

Authors or researchers can submit their manuscripts to be published online through the International Journal of Architecture, Art and Design (IJAD), Faculty of Architecture Art and Design, Naresuan University. Further information can be found through https://so07.tci-thaijo.org/index.php/ijad

Creating User Account

International Journal of Architecture, Art and Design (IJAD) would like to invite you to submit manuscripts of your research work via our developed online submission system: Open Journal System (OJS). You have to create your own account if you are the first-time user at www.arch.nu.ac.th/ijad

1. There will be "Create Account" menu on the first page. You should select only-one Journal and click "Register" to add your data by following the step-by-step instructions for creating your account. If you did not understand, you can read handbook for author on the right top corner of the page.
2. You have to set a username and password for login system, we recommend using your name as your username and using phone number as your password. If you have an account but have forgotten your login details, go to Password Help on the website and enter you email address.
3. The system will send you an email containing instruction on how to reset your password.
4. Creating User Account
5. Preparing Manuscript

1) Manuscripts

Manuscripts submitted to the International Journal of Architecture, Art and Design (IJAD) must include:

A manuscript text file containing title page, abstract, keywords, contents, acknowledgments and references. Figures or tables could be included in this file. The title page of this file should include the title of the article, full names and affiliations of all authors, full postal address and e-mail address of the corresponding author.

2) Template

Figures and Tables must be included in the text file at the appropriate context of the manuscript. You don’t need to separate the figure and table files from the text file.

An explanation file containing the answer to reviewer comments for the revised manuscript. Authors who are instructed to revise their manuscript have to highlight all point of their responded in text files.

3) Contributors submitting manuscripts for consideration for publication should follow the following guidelines.

3.1 All manuscripts must be submitted via the Naresuan Journal Online Submission System using Open Journal System: OJS by Thai journal citation index: TCI at http://sc01.tci-thaijo.org/index.php/ijad

3.2 Manuscript files should be created by using Microsoft Word (.doc, docx files).

3.3 Manuscript must be written using high-quality language. For non-native English language authors, the article should be proof-read by a language specialist. Poor use of English could result in immediate rejection of the paper.

3.4 Manuscript should be no longer than 12 pages. The inclusion of more figures and tables will reduce the word allowance, and vice versa.

3.5 Manuscript should be prepared in a single column, double - spaced, with sufficient margins (2.5 cm) and insert line number for editorial and proof-reader's marks (12 pt.). Time New Roman (Font 12 pt. Heading 14 pt.) other fonts which will be changed into Time New Roman font used throughout and all pages numbered consecutively.

3.6 Abstracts should be no longer than 600 words. About 3-5 keywords should also be provided.

3.7 Tables and figures should be numbered consecutively.

3.8 Line drawings should be of high resolution and high contrast. Black-and-white or colour photographs may be accepted provided they are of high quality. They should also be provided as computer graphic files after the manuscript is accepted for publication and in the final form. Regardless of the application used, when the electronic artwork is finalized, the images should be saved as, or converted to, one of the following formats (Note the resolution requirements for line drawings, halftones, and line/halftone combinations given below)

TIFF or JPG: Colour or greyscale photographs (halftones): use a minimum of 360 ppi.

TIFF or JPG: Combinations bitmapped line/halftone (colour or greyscale): use a minimum of 600 ppi.

3.9 Acknowledgments should be as brief as possible, in a separate section before the references.

3.10 Citations of published literature in the text should be given in the form of author and year in parentheses; (Mongnan, 2014), or if the name forms part of a sentence, it should be followed by the year in parenthesis; Mongnan (2014). All references mentioned in the Reference list must be cited in the text, and vice versa (APA citation Style)

3.11 The References section at the end of the manuscript should list all, only the references cited in the text in alphabetical order of the first author's surname and no number in front of each reference. Titles of the journal or conference proceedings are not abbreviated (APA citation Style)

3.12 The revision manuscript should have the highlight on revised parts. Authors must be written the explanation (how they have revised) along with their manuscript.

Declaration of the International Journal of Architecture, Art and Design (IJAD)

1. International Journal of Architecture, Art and Design (IJAD) publishes second issues per year: (January – June and July – December). All manuscripts must be written in English.

2. The article is an original and has never been published nor in the process of reviewing for publication in other journals.

3. All photographs and illustration usage are responsibility based on each author's copyrights**.**

Main Contact
International Journal of Architecture, Art and Design (IJAD)
Faculty of Architecture Art and Design, Naresuan University
Muang District, Phitsanulok, Province 65000
Tel: (+66) 5596 2452 Email: ijad@nu.ac.th

Alternative Contact
Associate Professor Dr. Witiya Pittungnapoo
Editor in chief
International Journal of Architecture, Art and Design (IJAD)
Phone Tel: (+66) 5596-2492, E-mail: pwitiya@googlemail.com

Corresponding Contact
Ms. Kanokphorn Ieamlaor
International Journal of Architecture, Art and Design (IJAD)
Faculty of Architecture Art and Design, Naresuan University
Muang District, Phitsanulok Province 65000
Phone Tel: (+66) 5596 2452, E-mail: kanokporniam@gmail.com

INTERNATIONAL JOURNAL OF ARCHITECTURE, ART AND DESIGN (IJAD)
VOLUME 2, NO.1, JANUARY-JUNE 2024