

Local wisdom: Creating the environmentally friendly materials.¹**ภูมิปัญญาพื้นบ้าน: การสร้างสรรค์วัสดุที่เป็นมิตรต่อสิ่งแวดล้อม**Yuwadee Thong-on²Dr.Veerawat Sirivesamart³Dr.Namfon laisatrukklai⁴**Abstract**

The objectives of this research were: 1) to study the knowledge of local people. Being overlooked, 2) to create material being environmentally friendly. The application of the concept of local wisdom, 3) to apply for use in arts and crafts products, to achieve maximum benefit of the valuable local materials. People in modern times have seen the value of local wisdom, and awareness which is a conservation of this knowledge to continue.

Researcher studied was interviewed from the academics and scholars of the local, and collected data for experiment. The experiments used a different ratio of raw materials including sawdust, cassava flour, sticky rice flour, rice flour, cooked rice, cooked sticky rice, banana, eggs (egg whites), dammar, turmeric andrographis, together with mortar shell, banana fiber, sappan, moringa oleifera, cloves, titanium dioxide and chandaeng.

The formulation of the ingredients consists of 2 stages: Firstly, mixing 15 grams of sawdust, 50 grams of cooked rice, 25 grams of banana and 5 grams of clove. Secondly, 10 grams of mortar shell, and 5 grams of titanium dioxide were added to the 85 grams of the mixture of the first step to form the subsequent 36 formulas that are strong in nor weather.

The results showed that materials can be formed and a volume of not more than 1 inch thick, about the width, length and height not more than 6 "x 8" x 5 "properties of the material are environmentally friendly. When Angle grinder the surface will look similar to tracery of the marble. There is smell of cloves. Colors can be created by reducing sawdust then put herbs with colors as desired. By assessment from expert materials science, product design and marketing. The comments of the material can be used to create environmentally friendly products. There are possibilities of marketing, that conservation and awareness of the arts and the local wisdom and to stimulate new ideas about the value of the material. As a guide to those interested in the improvement and develop conceptual framework for further research.

Keywords: Local wisdom, the environmental friendly, awareness, participate.

¹ This article is part of PhD research, Ph.D. Program in Design Art at Faculty of Decorative Arts, Silpakorn University

² Researcher, Mobile 080 504 2269, email: yudee24@hotmail.com.

³ Dr. Program in Design Arts, Faculty of Decorative Arts, Silpakorn University, Advisor.

⁴ Asst. Program in Design Arts, Faculty of Decorative Arts, Silpakorn University, Co Advisor.

บทคัดย่อ

การวิจัย ในครั้งนี้มีวัตถุประสงค์ 1) เพื่อศึกษาองค์ความรู้ของคนในท้องถิ่น ที่กำลังถูกมองข้ามซึ่งเราสามารถนำความรู้ที่สืบทอดต่อกันมา 2) เพื่อสร้างสรรค์วัสดุที่เป็นมิตรกับสิ่งแวดล้อม จากการประยุกต์ใช้แนวคิดภูมิปัญญาพื้นบ้าน 3) เพื่อนำผลการวิจัยไปประยุกต์ใช้ในงานผลิตภัณฑ์ศิลปหัตถกรรม เพื่อให้เกิดประโยชน์สูงสุดต่อการสร้างคุณค่าวัสดุในท้องถิ่น ทำให้คนในยุคปัจจุบันได้เห็นถึงคุณค่าของภูมิปัญญาพื้นบ้าน และเกิดตระหนักซึ่งจะเป็นการอนุรักษ์องค์ความรู้นี้ให้คงอยู่ต่อไป

ผู้วิจัยได้ดำเนินการศึกษาสัมภาษณ์จากปราชญ์ชาวบ้าน นักวิชาการที่มีอยู่ในท้องถิ่น และค้นคว้ารวบรวมข้อมูลต่างๆ โดยได้ดำเนินการทดลอง ซึ่งมีการใช้ส่วนผสมต่างๆ คือ เศษวัสดุผงไม้, แป้งมันสำปะหลัง, แป้งข้าวเหนียว, แป้งข้าวเจ้า, ข้าวสุกบด, กล้วยน้ำว่าสุกอม, ไข่ไก่(ไข่ขาว), ชัน, ขมิ้น, ฟ้ายะลวย, ฝงถ่าน, ปูนขาวจากการเผาเปลือกหอยแครง, เยื่อกล้วย, ฝาง, ฝงมะรุ้ม, กานพลู, โทเทเนียมไดออกไซด์, จันแดง, ขมิ้นชัน, ขมิ้นอ้อย

ผลการทดลอง โดยกลุ่มตัวอย่างที่ใช้ในการวิจัยในครั้งนี้คืออัตราส่วนผสมมีการทำ 2 ขั้นตอนได้แก่ ขั้นตอนที่ 1 ได้อัตราส่วนผสมจาก ผงไม้ 15 กรัม, ข้าว 50 กรัม, กล้วย 25, กานพลู 5 กรัม นำมาผสม ผู้วิจัยเรียกวัสดุในขั้นตอนที่ 1 นี้ว่าผงไม้ปั้น ขั้นตอนที่สอง คืออัตราส่วนผสมของวัตถุดิบที่ได้จากการใช้วิธีผสมแบบจำเพาะเจาะจงโดยตารางสามเหลี่ยมจัตุรัสซึ่งประกอบไปด้วย ผงไม้ปั้น 85 กรัม, ปูนเปลือกหอย 10 กรัม และ โทเทเนียมไดออกไซด์ 5 กรัม(รูปที่ 3) ได้สูตรที่ 2 มีความแข็งแรง อยู่ได้ในสภาวะปกติ จากกลุ่มตัวอย่างในการวิจัยทั้งหมด 36 สูตร

ผลการศึกษาพบว่า วัสดุสามารถขึ้นรูปได้ โดยใช้แม่พิมพ์กดลวดลาย และมีปริมาตรความหนาไม่เกิน 1 นิ้วโดยประมาณ ความกว้าง, ยาว และสูงไม่เกิน 6” x 8” x 5” คุณสมบัติของวัสดุเป็นมิตรกับสิ่งแวดล้อม มีความแข็งแรง มีขอบเขตของการคงทนในสภาพอากาศปกติ เมื่อเจียรพื้นผิวจะมีลักษณะลวดลายคล้ายกับลวดลายของหินอ่อน มีกลิ่นอ่อนๆของกานพลู สามารถสร้างสีสันทันได้โดยการลดผงไม้แล้วใส่ผงสมุนไพรที่มีสีตามต้องการ โดยผ่านการประเมินผู้เชี่ยวชาญด้านวัสดุศาสตร์, ด้านการออกแบบผลิตภัณฑ์, ด้านการส่งเสริมตลาด มีความคิดเห็นว่าวัสดุนี้สามารถนำไปสร้างงานผลิตภัณฑ์ที่เป็นมิตรกับสิ่งแวดล้อมได้จริง มีความเป็นไปได้ในเชิงการตลาด เป็นการอนุรักษ์ พื้นฟู และตระหนักถึงศิลปะและภูมิปัญญาพื้นบ้าน และเป็นการกระตุ้นให้เกิดแนวคิดใหม่ในการมองเห็นถึงคุณค่าด้านวัสดุ เป็นแนวทางให้ผู้ที่สนใจนำกรอบแนวคิดไปปรับปรุงและพัฒนาเพื่อใช้ในการวิจัยต่อไป

Introduction

Presently, as modern technologies have been used, developments of materials science and technology are continuously growing up. These are the tools for successfully improving of materials abroad, resulting in being barriers to economic growth and making material technologies in conservation extremely insufficient. Alternative materials that can- be developed, that is bringing the material technology used for development the local materials⁵.

⁵ Sataphon Deebunmee. & Pichai Sodpiban, 2552 : 1

Can be applied the local wisdom for used the local products. The knowledge of the local community from experience and inherits gets passed on from the ancestors go to another in society, and that are culture. This wisdom is caused the origin of life, traditions, religious beliefs, livelihood, and art, but when our global economy has grown, influential from technologies have intervened living conditions of the society in Thailand. Community was changed with modern society, to make the local wisdom adapting as well. Knowledge from the old generation when no inherited, lost began a livelihood in with modern technology that was change from a sustenance to be sold⁶, and production it also, emphasis on revenues too.

Furniture making as industrial family of Community of Ban Koh Hong, Nakhonsawan (Figure 1), produces a lot of waste sawdust causing of environmental pollution. Although some business operations and official agencies have used this waste for their either creation so researches, it is still and also use chemical to make furniture.

However, if they consider the concept based on local wisdom and using the eco-materials for furniture building⁷, they will accordant with the craft products, and provide maximum benefit to the society and community.



Figure 1: Sawdust from production of furniture as industrial family from Ban Koh Hong Community, Nakhonsawan.

An initial concept was to use waste sawdust to create environmentally friendly materials, by interviewing, collecting informative data from local scholars and academic people within Nakhonsawan, and using the useful information to creatively generate material being environmentally friendly.

⁶ Management Integration, 2547 :59

⁷ Thames & Hudson, 2004 :15

Materials and Methods

The framework of methodology of this research consisted of three concepts, including the concept immanence, introduces the concept of the environment and community participation in the research process respectively, following as Figure 2.

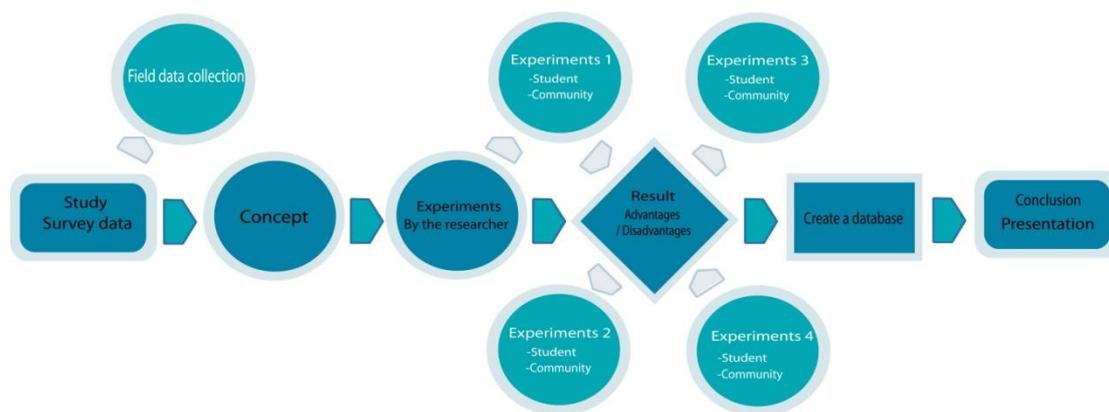


Figure 2: Methods of Local wisdom: Creating the environmentally friendly materials.

Stage 1: conservation of information, interview the local scholars, collection of photographic evidence.

Stage 2: generation of the three ideal concepts composting of local wisdom, environment and participation of the local students and community in the research process

Stage 3: use the sawdust produced by the community, basing on combination between the ideas of local wisdom and the environmental concept, to make the initial materials, which were conducted by the researcher and participation of students and the community (experiment 1 and 2)

Stage 4: evaluation the experimental results (derived from experiment 1 and 2), including the design process, prototyping and forming by students and the community (experiment 3 and 4)

Stage 5: construction of material databases.

Stage 6: conclusion and presentation.

Tool used in research

The tools used in this research are interview, recorder, and camera as well as some instruments used for the experiments such as steelyard, sieve, square mold (size 7x7 cm),ware, thermometer, plaster craft, mold, silicone rubber and rice grinder.

Results

The study found that some data is consistent with the local wisdom about to be made the votive tablet. The researcher has applied the local wisdom of the community to create materials those could be environmentally friendly. There are materials from the conclusion following;

Sawdust, from furniture building as industrial family from the community of Ban Koh Hong, Nakhonsawan, wasted from many used woods including plywood, lath, jackfruit wood, Iron wood, teak wood, keruing wood, rusak wood, dalbergiacultrata wood, makha wood, padauk wood, selangenbatu wood, mangaris wood, pine wood.

Banana, an academic, Thavorn Pudtanthong (interviewed on the 27th of December in 2553), said “previously people used ripe banana to fix roof leaks for preventing rainwater⁸. This is wisdom that still can be used in our daily lifestyles. Furthermore, there are nutrients in bananas. Also, raw banana is an astringent to remedy for diarrhea and indigestion, as ripe banana is a laxative gastritis. For hard stool or bloody diarrhea hemorrhoid, also make milk of women for childbearing born.

Rice has white opaque crumbly, the chemical elements of starches carbohydrates. Consists of amylose and amylopectin. It is very soft and sticky⁹, but the ancestors of Thailand can choose varieties of rice are appropriate to the environment for the best quality¹⁰. Belief the story about rice from Thailand, there are meaning more than the main meal, and income is the foundation of the faith traditions, until the cultural life of Thailand. Farmers believe that the "mother goddess of grain" as ghosts or angels. Thus worshiped as the goddess rice. Because rice is the staple food such as children grow comparable stepmother, when we eating must be eaten all. Farmers are rituals in almost all stages from harvesting, plowing, transplanting the rice barn. When the rice was done Kwankhao is pregnant. The Rituals and rituals are Called different names. Early are harvested, people cooperate not to hire workers, that is unity, collaboration in social. Nowadays, these cultures are gradually disappearing over time¹¹. Other than, the singing and dancing about this rice for enjoyment of group as the songs such as Tengaum-ruam-kheal song, Song-phang song and Kheal-khaow song¹², etc.

⁸ Benjamas Silayoy, 2545: 245

⁹ Onanong Naiweekun, 2547: 42.

¹⁰ National Science and Technology Development Agency, 2544: 22.

¹¹ HRH Princess Maha Chakri Sirindhorn, 2538. Cited in Onanong Naiweekun, 2547: 15.

¹² Song-gran. 2544. Cited in Onanong Naiweekun, 2547: 15

Cloves, Interviewed with Mrs. Wanpen Jadnueang on the 16th of February in 2554. She said "Clove is an herb that has properties spicy, killing and inhibiting the growth of microorganisms, for the anesthetic, aromas, for a toothache, and put in canned food"¹³

Mortar shell. Used in industries such as amulets, powder mixed with oil, other ingredients are also used as eaten betel nut. Mortar shells are commonly calcareous shells of cockles. Also made into fertilizer as well.

Titanium dioxide. To prevent bacteria, and help in the decomposing. Reaction because will work when the bacterial cells surface. When bacteria spread to on the surface, and the titanium dioxide will not resulting performance degradation after the destruction of bacteria¹⁴.

Tung oil is a vegetable oil extracted from the seeds of the fruit *Aleurites Fordii* oil is made in China, Thailand called that "Taggaigw" as binders for used makes the material soft and no longer sticky.

Votive tablet. Interviewed with Provost Niyut Theeprakhun, on the 29th of April in 2554. Atkho-Hong temple, Nakhonsawan. He said, before the era, components are mass of belief, cooked rice, leftovers or lime, mortar shell, ripe banana. tung oil, sugar or honey, leather glue. Put material mixing. Then be fermented. After fermentation there is lime water will be red. And put material into the mortar until it dampish. And grind until well mixed. If less material you put lime or white clay filler. If you want a color. Can put the color in that from herb.

The process of pounding the Votive tablet in the antiquity. No have grinder. Making mashed. Put a half cup of Tung oil, one cup of leather glue, and half an hour for mashed. The mass must be dump. After finish try clutching and squeeze. Look that like clay- solid shall be used.

Experiments to create the environmentally friendly materials conducted the silicone rubber mold with size 7 cm x 7cm.

¹³ Rungrat Leangnateethape, 2540: 92.

¹⁴ Montree Jaiyeam, 2555: 18

Table 1. Experiments of initial materials.

Experiment no.	Raw materials	Characteristic of materials/ drying time (days)
1	Cook rice 30 g. Banana 30 g. Sawdust 15 g.	Rough surface/ 3 days
2	sticky rice flour 30 g. Banana 30 g. Sawdust 10 g.	Slight rough surface / 3 days, brittle fracture easily.
3	sticky rice flour 30g. Banana 20 g. Sawdust 10 g.	Slight rough/ 2 days
4	sticky rice flour 30g. Banana 15 g. Sawdust 15 g.	Slightly rough/ 2 days
5	rice flour 30g. Banana 20 g. Sawdust 10 g.	Slightly rough/ 2 days
6	rice flour 30g. Banana 15 g. Sawdust 15 g.	Slightly rough/ 2 days
7	cooked rice 40 g. eggs (whites) 1/4 cup Sawdust 30 g.	Rough surface / 3 days, brittle
8	cassava flour 40 g. eggs (whites) 1/4 cup Sawdust 20 g.	Slightly rough/ 2 days, brittle
9	cooked rice 30 g. Banana 30 g. Sawdust 15 g. dammar 10 g.	Rough surface / 3 days, brittle
10	cooked rice 50 g. Banana 20 g. Sawdust 15 g. cloves 5 g.	Rough surface / 2 days, mild smell

Experiment no.	Raw materials	Characteristic of materials/ drying time (days)
11	cooked sticky rice 30 g. Banana 30 g. Sawdust 15 g.	Rough surface / 3 days
12	cooked sticky rice 30 g. Banana 15 g. Sawdust 15 g.	Rough surface / 2 days
13	cooked rice 30 g. Banana 30 g. Sawdust 10 g. mortar shell 10 g.	Rough surface / 2 days, brittle
14	cooked rice 60 g. Banana 60 g. Sawdust 20 g. mortar shell 10 g.	Rough surface / 4 days
15	cooked rice 50 g. Banana 50 g. Sawdust 20 g. mortar shell 5 g.	Rough surface / 4 days, strength material
16	cooked rice 50 g. Banana 20 g. mortar shell 2 g. Sawdust 15 g.	Rough surface / 3 days, strength material
17	cooked rice 50 g. Banana 40 g. mortar shell 2 g. Sawdust, turmeric 20 g. Banana fiber 3 g.	Rough surface / 3 days, strength material, yellowish.

The products of experiment 16 and 17 (Table 1) are strong features, so they have been used to create a set of handicrafts jewelry as a case study (Figure 3).



Figure 3: A set of handcraft jewelry (as a case study) produced using mixed materials of experiment 16 and 17 (derived from table 1).

The experiments showed that resulting material can be kept in normal weather but keeping nearby water spray could be cause of fungus in materials. The formulation of the ingredients consists of 2 stages: Firstly, mixing 15 grams of sawdust, 50 grams of cooked rice, 25 grams of banana and 5 grams of clove (Table 1.1), called "sawdust- form". Secondly, chooses the second formulation, getting the mixture from 85 grams of the firstly, 10 grams of mortar shell, and 5 grams of titanium dioxide. Then the samples were formed with 36 formulas which are strong in weather. (Figure 4)There is aromas of soft from clove. Result of materials contracted about 15%. When Angle grinder the surface will look similar to tracery of the marble.



Figure 4:. The formulation of materials, from a triangle tri Excel of specific random.



Figure 5: Result of experimental materials, size 22x52 cm. of low relief sculpture.

The results of experiments, the material is solidifies, 4 day period, the material is dry, material solidifies, but material is bent, caused the shrinkage of the material is the scale 20 x 50 cm, there is soft clove aromas.



Figure 6: Result of experimental materials, size 60 x 95 cm. of low relief sculpture.

The results of experiments, the material is solidifies, in 7days, the material is dry, material solidifies, but the material is cracked, caused the shrinkage of the material is the scale 55 x 90 cm, there are soft clove aromas.



Figure 7: materials to experiment, from students in the Community, Bann Mon pottery group, and compressed mold.



Figure 8: Integration of the created materials for craft products participation with the community and students.

The experimental results of environmentally friendly materials



Figure 9: The environmentally friendly material, that is a vase.



Figure 10: The environmentally friendly material, which is a candlestick.

Results in this research showed material of second formula, based on the rational triangle from the triangle tri excel of specific random, is strong and can be kept in normal weather. However, approximately 15% of the material shrinks as grinding surface is similar marble texture. Additional, there is a distinctive smell of cloves. If the product is designed as a box shape, or have a part to put the camphor, aromatic helped create interest. Then the samples were formed with 36 formulas. To assess the experts in materials science, the products design, and the marketing promotion.

Conclusion

Result of the experiment from sawdust waste in the community. To create a material that is environmental friendly. To used knowledge of the local wisdom, to make the new generation awareness the art and value of local wisdom, and environment. Said that the material from the results of this experiment are according to the design process is environmentally friendly¹⁵. It is stimulate new ideas. Moreover, the conservation, awareness the art and local wisdom in NakhonSawan. And also as a guide for those who are interested in improving and developing. And can bring the conceptual framework for further research.

References

- Benjamas Silayoy. Banana. Bangkok : Kasetsart University, 2545.
- Excellent Center for Eco-Products, Environmental Design. A Global Guide To Designing GreenGood, Bangkok, 2009.
- Management Integration Department of product. Environmental technologies and life. Kasetsart University, 2547.
- Montree Jaiyeam. Soil affects the soil to absorb musty smells from Bann Mon Ban-Kang Sub-district Sriphum sub-district, Mueang Nakhon Sawn district, Nakhon Sawn province. Master of Science dissertation. Naresuan University, 2555.
- National Science and Technology Development Agency. 2544.
- Onanong Naiweekun. Rice:Science and Technology. Bangkok:Kasetsart University, 2547.
- PraneeTantayanuboud. Local wisdom. Dhurakij Pundit University, 2550.
- Rungrat Leangnateethape. Spices and Medicinal Plants. Odeon Store, 2540.
- Sataphon Deebunmee. &Phichai Sodpiban. 2552, The local material. O.S.printing House. Bangkok Thailand
- Thames & Hudson., 2004, The Eco-Design Handbook A Complete Sourcebook For The Home And office, Printed and boundinChinaby Midas Printing.

¹⁵ Excellent Center for Eco-Products, 2009: 17.