ADDING VALUE TO MANGROVE CHARCOAL DEBRIS FROM MANGROVE CHARCOAL INDUSTRY

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Abstract- In Yeesan, Ampawa, SamutSongkram province has produced the mangrove coal for a long time, inherited the techniques and has been making charcoal from Chinese. Yeesanproduces a lot of the mangrove coal because there aremore mangrove forests from reforestation which is the villager's concession. Yeesan is far 6 kilometers from the gulf of Thailand, thus the environment is suitable for growing the mangroves. The perfect age of mangrovefor making charcoal is about 12-15 years old, and the villager will grow 100,000 mangroves per year for reforestation.They will grow the mangroves by switching the area and ranking the area which one is the first for growing one by one,so that they can make the mangrove coal all the whole year. Each production of mangrove coal is around 4-5 tons, it takes 10-12 days for production, moreover they will transport to the middleman.The lack of the mangrove coal is used for the footpath, therefore the author thinks that the mangrove coal bits should bedeveloped into the designing product of value.

The sample group for this study is 5 professors about Mangrove coal in Yeesan, Ampawa,SamutSongkram province. For collecting information analyzed by questionnaire, presented by the descriptive statistics, percentage and mean.

From study

1. The mangrove coal affects to absorbing color, smell and the dirtiness in the water. The quantity of the mangrove coal affectsto absorbing color, smell and the dirtiness in the water.
2. The process of making the mangrove coal shape uses the same process of charcoal but change the shape from cylinder into the mackerel shape. Using the mangrove coal bits combines with water and tapioca flour. The villager can make it on their own.
3. The development product from the mangrove coal bits increases the value and income to the villager in Yeesan, Ampawa, SamutSongkram province.

Index Terms- Mangrove Charcoal, Adding Value, Sustainable Development

I. PERFACE

It is well known that charcoal has long been human's counterpart since the Iron Age, about 450,000 years ago, until now. The first human use of charcoal was for iron smelting. Later, when human demanded for more charcoal, they devised a way to produce charcoal to meet their increasing needs. Unfortunately, producing charcoal at that time had impacts on various aspects, to include air pollution, wild fire, and inability to produce when it rained. For this reason, human never stopped to develop the methods of charcoal producing as well as techniques and furnace types. Evolution of charcoal furnace is classified into two categories: divided by region and by type of production. To divide charcoal furnace by region includes the Middle East, China, and Europe. To divide charcoal furnace by type of production, on the other hand, includes the local production and industrial production. The local charcoal production varies from each local terrain resulted by conditions of weather, forest, and so on. The local production can be divided into two methods: landfill and furnace methods. Whereas, the industrial production is divided into three methods: dry wood separation method, dry distillation method for turpentine producing, and carbonization method for charcoal production. The quality of charcoal is based on the types of wood and carbonization processes. In simple terms, burning soft wood yields soft charcoal while burning hard wood consequently yields hard charcoal. The burning process also makes difference in charcoal's quality: the higher the heat, the harder the charcoal produced. When the charcoal burning is complete, if we remove the charcoal from the furnace and coat it by sprinkling white powdered charcoal on top, the charcoal will ignite longer and can add up to very high heat. However, this type of charcoal, which is called "white Charcoal", is difficult to set on fire and suitable for cooking. On the contrary, if we leave the charcoal to cool down inside the furnace after the burning process, the charcoal will be black in color[1]. Charcoal has many benefits in various fields: agriculture, livestock, construction, and others. Charcoal's benefits in agriculture include soil improving ability, chemical absorbing quality, and the ability to prevent plant diseases, etc. Its benefits for livestock varies from the use for grass fermentation, adding value and helping with digestion system, reducing stomach gas, preventing diarrhea, assisting in quantitative and qualitative improvement of meat and eggs, etc. Charcoal is also known for its benefits for construction; it helps extend building's lifespan, improves goods storage, provides air conditioning and humidity control in buildings and houses, etc. Besides, charcoal's other benefits include its use for refrigerator deodorizing, water filtering, grass lifespan extending, and waste treatment [2].

At a charcoal producing community in Ban Yisan, Amphawa district, SamutSongkram province, the

locals have been producing mangrove charcoal using techniques and methods learned from the Chinese which have been passed through generations. At this village, a great amount of mangrove charcoal is produced due to substitute mangrove trees growing on the villagers' land. This area is suitable for the industry since it is located only 6 kilometers away from the Thai Gulf, within sea water floods reach which fits perfectly for growing mangrove trees.



charcoal producing in Ban Yisan

The mangrove trees suitable for charcoal producing are those between 12 - 15 years old. The villagers of Ban Yisan grow approximately 100,000 mangrove trees annually to substitute for the ones taken to make charcoal. The trees are planted in plots, arranged in order of age to guarantee a year-round mangrove tree supplies for charcoal producing. The method used involves locally developed furnace made with bricks and soil dug out of fresh water flooded area in Phetchaburi province[3]. The process of burning, fire and heat control, as well as smoke observing is the collective wisdom passed along for generations. Each lot of production takes as long as 10-12 days and yields about 4-5 metric tons of mangrove charcoal. The produce is then shipped to the middleman for further trade. Obviously, this mangrove charcoal industry can be sustainable as long as there is a good management and the demand. Mangrove charcoal's quality which makes it highly needed is due to the charcoal's hardness, density, yielding high heat, and not cracking. These characteristics of mangrove charcoal make it much sought after in international market to include Japan and Taiwan where it is popular for cooking purpose. However, the mangrove charcoal's market is inclining as there is less demand from consumers both domestically and internationally. This results in closure of charcoal making shops, charcoal middleman, and exporter. This is an impact from the increase of people using gas for cooking. The situation urged the interest of Her Royal Highness Princess MahaChakriSirindhorn who granted a permission for mangrove charcoal to be sold at her supported Phufa shops in order to promote the locals' occupation [4].

II. STUDY RESULTS

1. Mangrove charcoal affects the absorption of water color, odor, and impurity. In addition, the amount of charcoal used also affects the quality of water color, odor, and impurity absorption.
2. The process of extrusion using the same method as that of charcoal briquettes producing, but with an extrusion mold in form of mackerel shape instead of cylinder, applied to mangrove charcoal debris mixed with water and starch resulted in well pressed charcoal and could be done locally by the villagers.
3. Product development of mangrove charcoal industry's debris for the purpose of added value could increase income of the mangrove charcoal production community in Ban Yisan, Amphawa district, SamutSongkram province.

III. OBJECTIVES

1. To add value to mangrove charcoal industry's debris by designing a product development.
2. To transfer the knowledge to develop mangrove charcoal industry's debris to the villagers of Ban Yisan, Amphawa district, SamutSongkram province for the purpose of commercial production capability and business development.

IV. RESEARCH MOTHOLOGY

Step 1 - Study of background information on wooden charcoal, mangrove charcoal, product design, and Ban Yisan community.

The data sources used in this research are categorized as follows.

1. Primary Source includes the information that the researcher manually gathered from experts by interviews, questionnaire, and observation. These are vital tools used for data collecting of this research.

2. Secondary Source includes the information related to the research topic which the researcher gathered from other sources in which other individuals or organizations have collected such as reports, researches, theses, journals, books, textbooks, newspapers, websites, and others.

Data Analysis The researcher analyzed the data from the recording forms by applying the information derived from related studies, books, documents, and researches to the analysis and then concluded in a format of content analysis.

Step 2 - Study of mangrove charcoal debris development formats for further development.

1.Data Source

1 Related documents, books, and researches

2 Data collection tools

2.1 Recording Forms

Tools creation and development

For adding value to mangrove charcoal industry's debris, the research designated the process of tools creation and development as follows.

1.Research recording forms, documents, books and researches related to wooden charcoal, its quality, and product development guidelines

2.Data collect For adding value to mangrove charcoal industry's debris, the research gathered data and information from related studies, books, documents, articles, and researches and conducted an experiment as well as recorded the results in the recording form.

3.Data analysis The researcher analyzed the data from recording for derived from the experiment of mangrove charcoal's various characteristics, analyzed an concluded the quality that could be brought into account when designing the product.

Step 3 - Conclusion of data analysis on product value adding to be used as guidelines for designing, conclusion of data analysis of product value adding process

Step 4 - Giving away of souvenir and interviewing for satisfaction level of mangrove charcoal makers, bringing the product to the mangrove charcoal makers and interviewing for their satisfaction level.

1 Data source
  1.1 Five mangrove charcoal makers
2 Data collection tool
  2.1 Satisfaction questionnaire

V. SUMMARY

To summarize, results of study on adding value to mangrove charcoal industry's debris are as follows. From the first objective which isto add value to mangrove charcoal industry's debris by designing a product development, the researcher chose to study the process of extrusion of charcoal briquettes producing as a guideline.



Charcoalbriquettes extrusion process

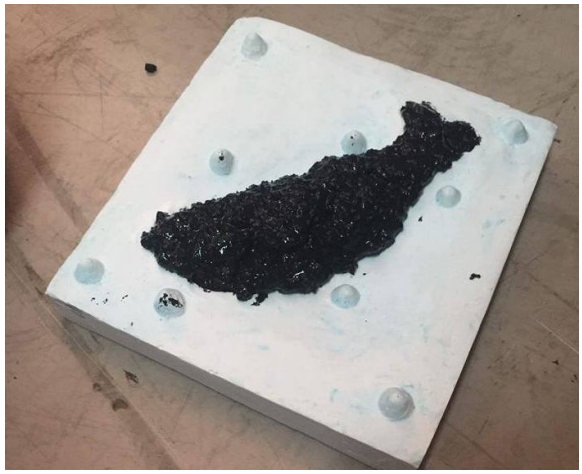
From the second objective which is to study the techniques of using mangrove charcoal debris as a material to design a product as SamutSongkram province's souvenir, once the researcher completed the study according to the first objective, the researcher then developed a product using extrusion process similar to charcoal briquettes producing. However, in this process, instead of using extrusion cylinder, the researcher chose a mackerel-shaped mold in which a mixture of mangrove charcoal debris, water, and starch was pressed to form the mackerel shape.



Product mold (mackerel from mangrove charcoal debris)



Compress process (mackerel from mangrove charcoal debris)



Finished product (mackerel from mangrove charcoal debris)

From the third objective - to increase income of the mangrove charcoal making community of Ban Yisan, Amphawa district, SamutSongkram province;
The measurement result from five experts' provided data shows that the satisfaction level toward the product made from mangrove charcoal debris was in highly satisfied level. Moreover, the product could increase income for the mangrove charcoal making community of Ban Yisan, Amphawa district, SamutSongkram province at the most satisfied level.

VI. DISCUSSION

The researcher had studied the approach of adding value to mangrove charcoal debris by the charcoal extrusion to form various shapes. Initially, mackerel was chosen as a model for adding value to the mangrove charcoal debris as souvenir. The design of the souvenir was simple and the locals could produce it within their community. This is another way of adding value to debris which will also promote the increasing income of the villagers at Ban Yisan, Amphawa district, SamutSongkram province.

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