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Fire Blocks: Paper as a Renewable Source of Kindle for Fires

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This research aims to explore the utilization of paper as a form of a renewable source of fire to effectively reduce the amount of used paper in Metro Manila. The researchers also aim to find out if paper briquettes would be an acceptable alternative for charcoal. Our research proposes the use of biomass briquettes as an alternative to wood charcoal.

This research traced indigenous researchers concerning the efficiency of biomass briquette and how this can apply in the Philippine setting. The whole concept of paper briquettes has the essence of "hitting two birds with one stone" with its quality of being a low cost and wood-saving quality- it provides household economic efficiency and environmental efficiency.

Since barbecue using charcoal is very popular in Metro Manila, we tried to use in this research grounded theory to generate deeper understanding and realities why household used charcoal despite the presence of paper briquettes. As part of our design, we demonstration how paper briquettes are usually prepared and how long it burns. In our findings, we discover that most users of charcoal have little knowledge about paper briquettes. Some of the problem we encountered includes the nature of smoke generated by paper briquette and its negative effect on one's health. With our discoveries, we recommend a further study about paper briquette.

Key words: Briquettes; Biomass; Alternative energy

I. INTRODUCTION

1.1. Problem: The Wood -fueled fires

Wood has been the primary source of fuel in fires, ever since it was first discovered 3.4 million years ago. In present time, unknowingly, the use of wood in supplementing fires poses a great deal of threat to the health of individuals constantly exposed to it.

Burning wood produces smoke that hold fine particles of dust called "particulate matter" when inhaled, would result to a number of respiratory diseases such as: asthma, emphysema, lung cancer, bronchitis and even premature death, long term exposure to smoke is also linked to infant mortality and low birth-weight among pregnant women and children. Wood smoke is also a major contributor to the fast-rising air pollution in the planet, the smoke that it produces is made up of different greenhouse gases which may also be harmful to humans. Another problem is that the supply and demand of wood is not even, wherein, trees, which produce wood, cannot grow at the same rate of which it gets harvested, this, then results to wood getting more and more costly as they grow scarcer.

The research aims to explore the utilization of paper as a form of a renewable source of fire, to effectively reduce the amount of used paper in Metro Manila and how it can reduce the harmful effects of smoke, to humans who are exposed to it. Likewise, the researchers aim to explore which paper is the most effective in the process of constructing paper briquettes. This study also aims to provide households with clean and low-cost materials to provide energy for their homes that would burn longer than conventional wood charcoal. Lastly, the aim of the study is to find out if paper briquettes would be an acceptable system among its users and demographic based on its appeal and review.

1.2. Framework

This qualitative research will be utilizing the grounded theory since the topic does not have sufficient examples of indigenous researches, because it remains unpopular among local researchers and is often overlooked as a possible option in waste reduction and recycling.

2. LITERATURE REVIEW

2.1. The Benefits of Biomass Briquettes

As stated in Biomass (2012), everyone is thinking about how to make their homes greener and how to save energy. Everyone is aware of the problems presented by global warming and we are all thinking of ways to change our lifestyles in order to help stop this phenomenon and keep our world safe. This is why biomass briquettes are important.

The main source of energy for most areas of the world is fossil fuels, which usually makes use of coal in order to power boilers to make steam for energy. Briquettes made from biomass are a great substitute for coal, since they are made of natural materials and do not add to the pollution in the world (op. cit).

Because of the production of briquettes, many companies use biomass briquettes since they found out about its benefit and how it can lower their carbon footprints while being affordable. These briquettes are cheaper than coal in the long run, and can be used for a long time.

Coal is one of the most dangerous ways to produce energy nowadays because of its pollution to our environment. This is why it is necessary for us to limit our use of charcoal and find another way to get energy. Biomass is a great way to do this since it is easy to get and use

Usually, the briquettes are made from plants and natural waste from animals. It recycles them and turns them into an energy source, so they are an ideal material. They do not have any of the disadvantages of fossil fuel energy and it us easily renewable. It does not emit greenhouse gases or any toxic chemicals.

The biomass materials are compressed into briquettes so that they can be used by energy producing companies to replace charcoal. These burns just like charcoal but they do not produce any harmful effects to the environment. They can be used to boil water and power turbines to generate electricity.

Biomass also gets rid of the need to have fossil fuels exported and imported around the world, since it can be made domestically from plants and animal waste. This will lower the price of electricity for many countries that do not have oil or coal reserves. It will mean affordable and safe energy for everyone.

Briquettes are better than loose biomass since they are compressed. This compression allows them to burn for a lot longer than if it was loose. Also, it does not take too much money to compress these so it will be inexpensive for people to attain

With the research being put into biomass briquettes for energy, we can expect that soon the world will have a new source of energy. It is a big step in making our lives eco-friendlier and protecting our world. (op. cit).

According to studymoose.com, Paper charcoals are made by soaking paper overnight and forming it into fist size balls which are left to dry in the sun. Paper charcoal serves as a good alternative fuel for cooking. Encouraging the user of paper charcoal as an alternative for fuel is a good practice. Waste paper that would otherwise end up in landfills is given new use as a cooking medium. This will also help reduce dependence on forest wood for cooking. Since this is made out of used paper materials, this is inexpensive and can be done by every household anytime. It does not produce soot like ordinary charcoals. A few pieces of these paper charcoals can be used for cooking and is very ideal to use during the rainy season (OISCA, 2012). Aside from its environmental benefits, it will also help families with their budget since paper charcoal can easily be made and the materials to be used are widely available. Paper charcoal may function differently than regular charcoal but it is very resourceful and eco-friendly.

Many Filipinos today rely on wood charcoal for cooking to save money. Metro Cebu, with its four (4) cities of Cebu, Mandaue, Lapu-Lapu and Talisayu; and six (6) municiplaities of Compostela, Lilo-an, Consolacion, Cordova, Minglanilia and Naga; has an average of about 2,000,000 in population as of 2001. It has an approximate total land area of 79,209 hectares making it the second gateway and the second largest urban area in the Philippines. With a rapid growing population and increasing urbanization, Metro Cebu is a great business spot. This is true for small-time food entrepreneurs like owners of a barbecue stall since Cebu is already synonymous to the word “barbecue”. The booming barbecue industry in Cebu uses mostly, if not all, wood charcoal as their main source of heat in cooking. Also, based on a 1994 study, three fourths of low-income households in Metro Cebu rely on charcoal as their primary cooking fuel and over 80% in the highest-income category use LPG (Suecyloe, 2012). According to OISCA (2012) Ramon Magsaysay Elementary School is one of OISCA CFP supported school. CFO has provided the school with

training on environmental protection and proper waste disposal. The school observes segregation of school trash and applies the environmental principles of the 3r's (Reduce, Reuse, Recycle). The school has encouraged the use of paper products which they have learned from the training and environmental education provided by OISCA.

According a survey by the Central Echo (2011), more than 90% of Filipinos are dependent on charcoal for cooking. While only 1-2% use liquefied petroleum Gas (LPG) or kerosene due to high cost of living. However, making charcoal means cutting trees. As a result, only species of trees that do not burn well are left in our forest. Therefore, there is a compelling need to find alternative fuel sources and new methods that can minimize the need for charcoal. Paper is the major contributor of solid waste by either weight or volume. Yet it is highly recyclable and can be manufactured into some other materials. Thus, paper charcoal was introduced as an alternative for charcoal. Also, it will not destroy our forests and ravage Mother Nature but instead, this will help reduce forest denudation due to charcoal making (The Central Echo, 2011)

According to Rizalina K. Araral (June 2015). A survey made by the team of Dr. Emelyne C. Cortiguerra of the Department of Science and Technology's Forest Products Research and Development Institute (DOST-FPRDI) showed that there is a high demand for charcoal briquettes abroad. According to the country's top charcoal briquette makers, foreign buyers often buy in large quantities which most of them cannot meet.

FPRDI Director Dr. Romulo T. Aggangan explains, "A charcoal briquette is a compacted mass of fuel material made from a mix of charcoal fines and binder, and molded under pressure. Although charcoal briquettes are not very well known in the Philippines, the product is already a household fuel in Europe and America. In some Asian countries, hotels and big restaurants use it for roasting.

Studies at the DOST-FPRDI show that charcoal fines for briquetting can come not only from wood and coconut shell but also from coconut husk, coffee bean hull and other non-wood biomass materials. In the Philippines, the first charcoal briquetting machines, studies on the production process, as well as technology demonstrations were initiated by the DOST-FPRDI," adds Dr. Aggangan.

According to Engr. Belen B. Bisana, head of DOST-FPRDI's Bio-Energy and Equipment Development Section (BEEDS), "Compared to plain charcoal, briquettes are less messy and easier to handle because they are compact and uniform in size. They are also easy to ignite, burn slowly, give more intense heat per unit volume and are almost smokeless when burning. Charcoal briquettes made from agroforest wastes may lessen the extensive charcoaling of wood, thus helping protect what is left of the country's forest resources." (op. cit).

Dr. Cortiguerra and her team's survey of the 16 top charcoal briquette producers in the country identified the strengths and opportunities of the industry. She reports, "The biggest strength is the huge demand for briquettes in the US, Europe, Japan, Korea and Malaysia. Likewise, as an alternative fuel, briquettes in the future can replace much of the country's expensive energy sources such as liquefied petroleum gas (LPG), kerosene and electricity. Other strengths include innovative producers and a wide range of available raw materials."

Dr. Cortiguerra continues, "The problems of the industry, on the other hand, include the sustainability of the raw materials, the very stiff price competition in the global market and high cost of transporting the product abroad. The low-capacity of most briquetting machines is also a major drawback, plus the fact that they are often hard to operate. Likewise, charcoal briquettes have suffered from low publicity which has led to low acceptability in the local market."

To grow the local market, she suggested that producers link with large scale buyers such as food chains, hotels, and poultry farms; study ways to use briquettes in other cooking systems, i.e., how can they be harnessed in lechon shops and bakeries?; demonstrate the advantages of using the product in supermarkets, malls and trade fairs, making sure that all claims are supported by facts; and lastly, producers must train people in rural communities on charcoal production and encourage them to become suppliers of raw materials for briquetting.

Dr. Cortiguerra concludes, "The problems facing the charcoal briquette industry may seem big, but they should not overwhelm entrepreneurs who believe in the promise of a green and efficient fuel substitute."

Biomass, as we can see, is abundantly available everywhere- both in the urban/rural regions. The only things we should do to make it useful are to utilize it properly through conversion

into briquettes, mainly for cooking purposes. Thus, the modern equipment in the new millennium that can solve problems on the traditional wood charcoal production known as "Charcoal Briquette Technology" was highly recommended in order to enhance the knowledge of urban/rural communities regarding the modern way of charcoal making while protecting natural forests. Thus, the modern equipment of charcoal briquetting technology that can solve problems on traditional wood charcoal production was recommended, This enhances the knowledge of urban/rural communities regarding the modern way of charcoal making while preserving and protecting natural forest. We can supply different kinds of charcoal briquette machines with different capacities and final product shape." (op. cit).

As said in an article by Rudy A. Fernandez of The Philippine Star (January 2010) Briquette is a mixture of charcoal made from various materials molded in various sizes and shapes with the use of a binder or starch.

The new briquette has been named "Don King Uling" by its creator, Florentino Montemayor Jr., a retired official of a multinational corporation and now barangay councillor of Batong Malake, Los Baños, Laguna. Don King Uling is a take-off from a noted donut because the briquette is shaped like the popular baked product. It is made of old newspapers, craft papers, cartolina and other types of used paper except the glossy ones. The materials are soaked in water overnight, shredded and compacted with the use of a pressing machine also devised by Montemayor.

"The product is used as a substitute for wood as charcoal fuel," he said. "The project is particularly focused on informal settlers and poor barangay residents who use charcoal stoves."

Since early last year when Don King Uling was conceived, more than a hundred families have been using the briquettes as more pressing machines were fabricated and sold at affordable cost to barangay settlers following the Los Baños, Bañamos Festival, which commemorated the historic town's 394th anniversary last Sept. 17.

Batong Malake officials have been helping sell the pressing machines to further spread its use. They said, as quoted by Kathleen Lungub, a student at the UP Los Baños College of Development Communication: "With the growing number of briquette users, we do not only help the people save money; we also help in the conservation of forests in the long term."

At least once a week, the Batong Malake committee on livelihood headed by Montemayor, together with councilor Allan Leron and Janos Lapiz, do house-to-house visits in communities to demonstrate and promote the use of portable, easy-to-operate pressing machine and scrap paper briquette.

One of the technology's users, Merlie Casipo, 53, said: "Mas magandang gamiting and papel na panggatong dahil mas maningas. Nakatipid ka na dahil mabilis mag-apoy, nakabawas ka pa ng basura."

A paper briquette is sold at P10 per kilo (eight pieces). One needs only four briquettes to cook a cup of rice. Don King Uling is cheaper than a kilo of wood charcoal (P20).

The project has been supported by the Los Baños-based Department of Science and Technology-Forest Products Research and Development Institute (DOST-FPRDI).

FPRDI engineer Belen Bisana said: "The advantage of using the paper briquette in cooking is primarily the utilization of waste papers. Using the product is also an economical and practical thing. Briquettes can last for longer period compared to wood fuel."

3. METHODOLOGY

The given respondents were purposively chosen to partake in the interview process of our research; we chose 20 respondents who use charcoal. We decided to use have 20 respondents because it sufficient for a grounded theory regarding the given topic of our research.

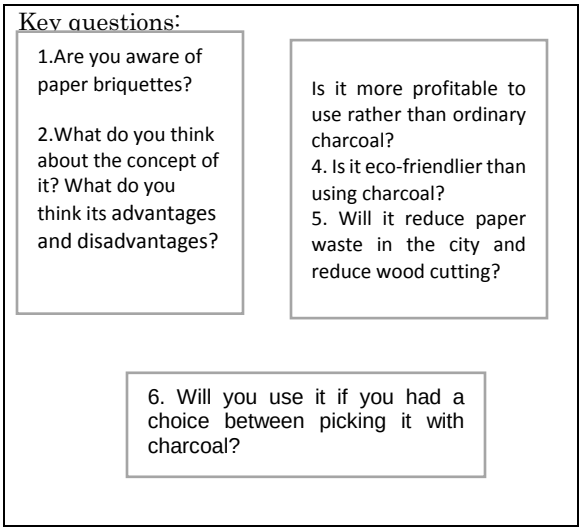
It was mostly comprised of homemakers who use charcoal regularly for everyday cooking, because, as charcoal users, they would have enough experience to "critique" and weigh in their opinions on standard charcoal. Among the sets of respondents are vendors who use charcoal for making and/or cooking their retail items, the reason behind it is the same with homemakers, we also included in the interview an actual producer of wood charcoal. We presented a consent letter to each respondent to

establish that their identities will remain confidential throughout the whole process.

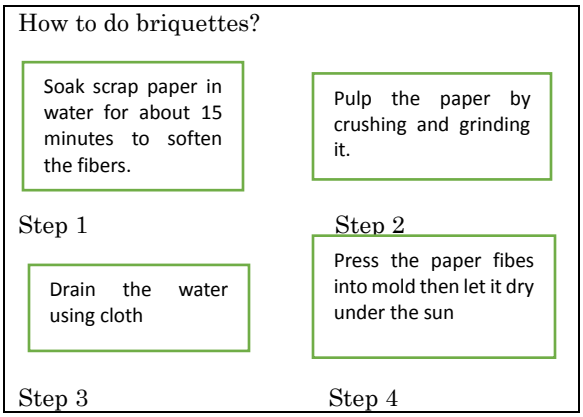
The interview was conducted in the marketplace of barangay Bagong Barrio, Caloocan City, because the location was highly urbanized and is considered to be a lower-class sector, meaning, there would be a higher chance of finding homemakers who use charcoal in cooking (open fire).

In terms of our procedures, we first met up on our scheduled time and date (11:30am on March 7, 2017). We initiated our interviews by two's, since our group consisted of 6 members; we had 3 sub-groups to efficiently do interviews. We separated and went to different areas to fin individuals who use charcoal. We had multiple copies of the questionnaire printed out and we recorded the data from the interviews via voice recordings.

We asked 6 different questions in a specific order: First, we asked if they knew about the concept of our research (paper charcoals), the we proceeded to ask if the thought it would be beneficial for them or not, in terms of its advantages and disadvantages, if it would be cheaper than regular charcoal, if, in their opinion, it was "eco-friendly", if it could reduce the growing waste in Metro Manila and if they would be willing to use the product if they were given the choice over regular charcoal. In this order, we could have a general idea of what they know and we could have them elaborate more because of the format of the questionnaire.



We introduced to them our paper briquette and how we did it:



4. RESULT, ANALYSIS AND DISCUSSION

The researchers conducted an interview for 20 people who use charcoal for business or home. 85% of the respondents interviewed were not aware of paper briquettes; therefore, 75% of the people did not clearly know the advantages and disadvantages of it yet. Also, as they weren't aware of this, it lead to 75% of them picking charcoal as the more profitable option. Due to its composition (; paper) 85% of the people agreed that paper briquettes are eco-friendly. Also, all of the respondents agreed that paper briquettes will reduce the cutting of trees and also paper waste in the city, this then resulted to 60% of the respondents choosing paper briquettes rather than ordinary charcoal.

We expected that the respondents will be unknowing of the topic but according to our survey, some people do know about it and one particular person said that they practice it in their province as a substitute to charcoal. She said it takes a lot of effort but nonetheless it is more efficient in burn time and profit.

Despite the fact that charcoal can be bought in a very cheap price, majority of the individuals we interviewed said that paper briquettes are more profitable than normal charcoal only just basing their opinions on our explanation. Majority is because of the eco-friendly factor of it, that it is made from recycled paper and that it also reduces waste paper as well as cutting trees.

Based on practicality, we expected that the answers of the respondents to our question whether they are willing to use paper briquettes or stick with the charcoal will lean more towards staying with

ordinary wood charcoal. The results are different than expected, showing that the respondents are willing to try paper briquettes if the chance was given to them to test and use it. Even though majority of the respondents cannot express their opinions about the concept, some were able to consider the advantages and disadvantages of our product that might help our research overall. The advantage of the product, said by the respondents, is the "eco-friendly" factor of it and the reduction of paper waste. However, the disadvantage of the product that it is faster to burn and it is dusty when burned, according to the respondents.

As we observed from our data, it seems that most of our respondents did not know about paper briquettes till then, so some could not give a firm judgment on whether it could be beneficial to them or not, implying that, so far, they do not have a specific position to stand in regarding the topic, because they are not informed enough to make those acumen.

Similar to the purpose of our study, all of the respondents agree that the utilization of paper briquettes can effectively reduce waste paper in Metro Manila and reduce deforestation in the country. One reason we constructed the research is to establish a system wherein it reduces pollutants while making it functional for the public to use. Majority of the respondents also agreed that producing paper charcoal/briquettes is more economical than with wood charcoal, likewise, they thought that a paper substitute for charcoal is, all in all, more "eco-friendly".

But unlike our position, some of the respondents thought that paper briquettes could expell more ash and therfore could affect the quality of their food. They also infer that paper briquettes will burn faster than standard charcoal.

5. CONCLUSION

Based on the facts and the conclusions we made in the data gathered, we found out that individuals are well-aware of the benefit of paper briquettes, even biomass briquettes, the only problem is that they did not know they had the option of doing so, in other words; no one suggested it to them that they could make alternatives of common, hazardous charcoal. That being said, we, as the researchers would recommend that individuals be properly informed about paper briquettes because they would obviously like to test it for themselves, what is left is that they do not have the chance to learn about new and ingenious alternatives such as this.

Secondly, we would like to encourage individuals to make their own paper charcoals at home, since everything needed for its construction is already available in any household. This will help them reduce daily budget consumption, cook what they need to, and in their little way; could help reduce pollution in the environment.

Since one of the purpose of the study is to reduce paper waste in the city, we encourage individuals to gather and collect scrap paper in large amounts so they have the supplies when they need it.

Also, based on our experience of constructing paper briquettes, we would recommend using thin and non-glossy paper to form briquettes, since the thicker kind is harder to break down and glossy paper does not absorb water well. Besides those two types of paper, any kind would be as effective.

We also recommend that local and governmnent organizations would conduct seminars and livelihood programs to promote the utilization of paper, as their energy source for cooking, so people would know how to properly make and use their paper briquettes. This would also allow the idea to further spread to different places and we could collectively grow "greener" and make a difference in the world.

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