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AN INVESTIGATION OF THE DRAWBACKS OF PRODUCTION OF ECO-FRIENDLY BRICKS AND THE REASONS OF THE LIMITED USES AMONG THE PUBLIC IN BANGLADESH

Mahfuz Alam[1], Uday Das*[2]

[1] *Undergraduate Student, Department of Civil Engineering, Rajshahi University of Engineering & Technology, Bangladesh, Country, e-mail: mahfuzalamrazon@gmail.com*
[2] *Undergraduate Student, Department of Civil Engineering, Rajshahi University of Engineering & Technology, Bangladesh, Country, e-mail: arkouday233@gmail.com@gmail.com*

***Corresponding Author**

ABSTRACT

In Bangladesh, the brick industry fulfills an annual demand of more than 35 million bricks with a value of sale over BDT 250 billion which is 1% of the total GDP. Although it has a huge impact on the economy, the production process of conventional bricks creates several environmental, health, and soil problem. Bangladesh has started producing eco-friendly bricks, but the production and uses are very limited. The study investigated the drawbacks of the production of eco-friendly bricks and the reasons for fewer uses among the public. To find out the issues a questionnaire survey was conducted among the brick kiln owners and the building owners in the region of Naogaon, Barishal, and Rajshahi districts. SPSS(Statistical Package for Social Science) was used to analyze the collected data, later Microsoft Excel was used. Lack of demand and technical facilities, unavailability of raw materials, and high implementation cost are primary causes according to the kiln owners. On the other hand lack of information about eco-friendly brick, unavailability and high cost are the main reasons according to the house owners. The study highlighted only the problems, further research may need to find the solutions.

Keywords: *Eco-friendly brick; Drawbacks; Kiln owner; Building owner; Bangladesh*

1. INTRODUCTION

Bangladesh is the 8th largest populous country in the world with 160 million people. At present Bangladesh's required shelter varies from 3 lakh to 5.5 lakh units annually. To accommodate the growing population Bangladesh needs to construct approximately four million new houses annually. People of rural areas migrate to larger cities like Dhaka from 300000 to 400000 each year. According to UNDP, rapid urbanization in the country has created a booming construction industry and enhanced the production of 8.6 billion bricks each year with the demand rate for the bricks rising at an annual rate of about 5.28 percent (Rupayan Saha, 2013). Brick industry fulfills a demand of 35 million brick per year with a value of sale BDT 250 billion. (NATIONAL STRATEGY FOR SUSTAINABLE BRICK PRODUCTION IN BANGLADESH, 2017) As a construction material bricks play a significant role. In, most of the Asian countries the art and science of fired bricks are the most important aspect of achieving systematically good quality but eco-friendly brick is often the most neglected. Although the significance of the brick industry on the development of the country's both construction and economic sector but the process of production is outdated, energy-intensive, and do not follow environmental rules and regulation. For example, In Bangladesh around 7,000 soil-burning brick kilns consume 5 million tonnes of coal, 3 million tonnes of wood annually, emitting in the process is 15 million tonnes of carbon in the air and cutting 1.27 billion cubic feet of topsoil (Pritu, 2018). As a result, the environment has faced long-term and short-term impacts. The short-term effects are hampering the normal vegetation process, declining crop production, deforestation, etc. Similarly, global warming, reduction in land fertility, ozone layer depletion, photochemical smog are

the long-term effects. According to research, topsoil is removed for the production of bricks, it takes 25 to 30 years to regain fertility for those lands (Jerin, 2016). Besides, people are suffering severe health issues such as respiratory disorders like lung cancer, asthma, chronic bronchitis, and emphysema because of polluted air and water. The above problems can be solved by alternate ways to produce eco-friendly brick. Eco-friendly brick have numerous health and environmental benefits. Eco-friendly bricks are often produced from waste materials, as a result it is helpful to the environment. Hollow blocks, one kind of eco-friendly brick, are produced from concrete. It don't need to burn and hence it is not harmful to environment and soil. Eco-friendly brick reduces air, environment and soil polution. Numerous research has been conducted on the production of eco-friendly brick. A table of eco-friendly is given below to show the availability of raw materials and suitability in Bangladesh:

Table 1: Availability of Raw Materials & Suitability in Bangladesh

No	Waste Raw Materials Used	Raw Materials	Test Conducted	Experiment Scale	Raw Material Availability in Bangladesh	Suitability in Bangladesh
01	River, Lake & Dam Sediment	Polluted (Industrial waste: Heavy metals) river sediment	Compressive strength; Freeze and Thaw Resistance; Water Absorption	Large scale	Available	Suitable
		Sediment of Savannah Harbor	According to the ASTM criteria	Laboratory Scale	Available	Suitable
		Reservoir Sediment		Laboratory Scale	Available	Suitable
02	Waste Municipal	Municipal Solid Waste Incineration		Laboratory Scale	Available	Suitable
		Sewage Sludge		Laboratory Scale	Available	Suitable
03	Waste Tea	Processed Waste tea; Raw brick Clay	Compressive Strength; Water Absorption; Density	Laboratory Scale	Available	Not Suitable
04	Fly Ash	Fly ash itself	Compressive Strength; Water Absorption; Permeability; Freeze and Thaw; Leaching	Laboratory Scale	Available	Suitable
05	Plastic	Composed of Cement; Sand and Re-pulped Waste Paper	Compressive Strength; Water Absorption; Thermal Conductivity	Large Scale	Available	Suitable
		Waste of Paper Mills; OPC (0-20% wt)	According to ASTM C67-03a Standards	Laboratory Scale	Available	Suitable
06	Paper & Paper	Recycled Paper; Clay	Compressive Strength; Field	Laboratory Scale	Available	Suitable

No	Waste Raw Materials Used	Raw Materials	Test Conducted	Experiment Scale	Raw Material Availability in Bangladesh	Suitability in Bangladesh
	Waste		Density; Thermal Conductivity			
07	Granulated Blast furnace slag (GBFS) (5-35%)	GBFS with hydrated lime	Compressive Strength; Bulk Density; Water Absorption	Laboratory Scale	Not Available	Not Suitable

(Zhang, 2013)

The eco-friendly brick produced from waste materials reduces environmental pollution, cut construction cost, lessen health problems, and makes building more earthquake resisted. The new bricks are also making it easier and cheaper to transport and lighter than the traditional one. For example, the blocks made of concrete are made from soil dredged collected from the bottom of the rivers, sand, cement, and iron netting (Star, 2019). The cost of a traditional brick is TK 8-8.5/per brick whereas eco-friendly bricks such as concrete blocks which cost TK 1/per brick (Star, 2019). Similarly, the sound and heat protection capacity of the above mentioned eco-friendly brick are higher than the traditional bricks and the humidity and salinity resistant nature of the concrete block ensures longevity (Mahmud, 2019). Despite the huge benefit of eco-friendly brick, the production of eco-friendly bricks by kiln owners and uses among the public is still very limited. There has been no recorded attempt to change the traditional production process to the modern eco-friendly brick-making process by the kiln owner. This paper intends to present the fact that drawbacks of the production of eco-friendly bricks and the reasons for fewer uses among people.

2. METHODOLOGY

This study was conducted at four upazila among three districts Naogaon, Barishal and Rajshahi which are located at 24.7936° N 88.9318° E, 22.7010° N 90.3535° E and 24.7106° N 88.9414° E with the area of 3436 km^2, 2785 km^2 and 2407 km^2 respectively. Primary data were collected by a questionnaire survey among two groups of individuals, the kiln owners (Group-1) and the building owners (Group-2). By this investigation try to measure the percentage which major factors mostly resisted them from production of eco-friendly bricks of the kiln owners and the reasons of less uses of building owners. The factors are lack of demand and technical facilities, unavailability of raw materials, and high implementation cost according to kiln owners. On contrast lack of information about the eco-friendly brick, unavailability and high cost are the main reasons to the house owners. In the questionnaire survey a total of 36 kiln owners and 120 of the building owners were randomly selected form the study area.

3. RESULT AND DISCUSSION

3.1 Group 1

Responds were recorded from kiln owners who were directly connected with manufacturing of bricks. From them we had tried to find out the answer of three questions. The first one was to find out why the kiln owners use wood instead of more environment friendly fuel like gas, biomass etc. Using Liquefied petroleum gas(LPG) for initial firing is most cost effective, environment friendly and it helps to achieve good combustion. Along with other savings LPG use also significantly decreases fuel

consumption, reducing energy cost. High production cost, unavailability of environmental friendly fuel are the main reasons which are mentioned by them. Besides, lack of govt. monitoring and others reasons like lack of knowledge on both fuel and environment of kiln owners have also been found out. The problem of high production cost have been mentioned by 56% of the kiln owners. Unavailability of Environmental Friendly Fuel, Lack of Govt. Monitoring were 31% and 8% respectively. About 8% of the kiln owners have mentioned some other reasons.

Table 2: Reasons of using wood insted of environment friendly fuel

Reasons	Number	Percentage
High Production Cost	20	56%
Unavailability of Environmental Friendly Fuel	11	31%
Lack of Govt. Monitoring	3	8%
Others	2	6%

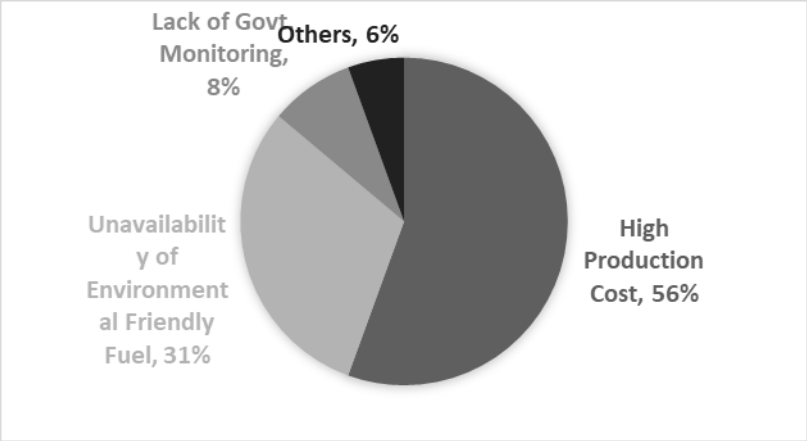

Figure 1: Reasons of using wood and coal

The second one was to find out why the brick kiln owners not showing interest in manufacturing of eco-friendly brick. And the last one was to find out the remedy of the problems asked in the second question. According to the kiln owners less public demand, scarcity of modern technology, fear of huge initial investment and insufficient raw materials are the main reasons of not showing interest in manufacturing of eco friendly bricks. Increasing public awareness, providing technological support, providing soft loan and enhancing raw material supply can be solution of those problems. The kiln ownwers have mentioned more than one problem themselves. Among the participants of the survey 25 kiln owners had mentioned about the less public demand. Scarcity of modern technology, fear of huge initial investment, insufficient raw materials had mentioned by 13, 6 and 17 kiln owners. 19 kiln owners had told about increasing public awareness. 18,8 and 6 kiln owners have told about technological support, soft loan and enhance raw material supply respectively.

Table 3: Problems of kiln owners and remedy

Reasons/Steps	Problems of Owner	Remedy Owners Want
Less Public Demand/Public awareness	25	12
Scarcity of Modern Technology/ Technological Support	13	24
Fear of Initial Huge Investment/Soft Loan	6	8

Insufficient Raw Materials /Enhance Raw materials Supply	17	6

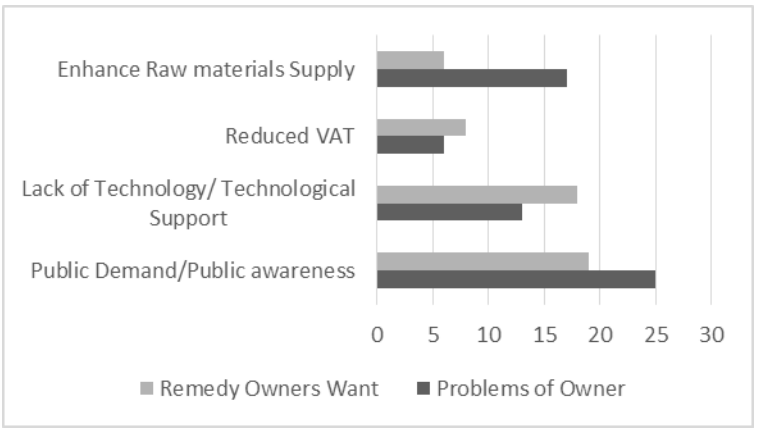

Figure 2: Problems of kiln owners and remedy

3.2 Group 2

A survey was also conducted among the building owners who are one of the largest group of users of brick. They were asked about the eco-friendly brick. About 50% of the users didn't heard about the eco-friendly brick earlier. Among them who had known about the eco-friendly brick, about 95% of the people didn't use eco-friendly brick in their building, only 5% people used eco-friendly bricks in their house. The majority who didn't use eco-friendly brick in their building have mentioned about the problems like unavailability (35%), cost (9%),don't have clear idea about its sustainability of eco-friendly brick (51%) and others (5%).

Table 4: Reasons of not using eco-frienldy brick

Reason	Number	Percentage
Unavailability	20	35%
High Cost	5	9%
Sustainability	29	51%
Others	3	5%

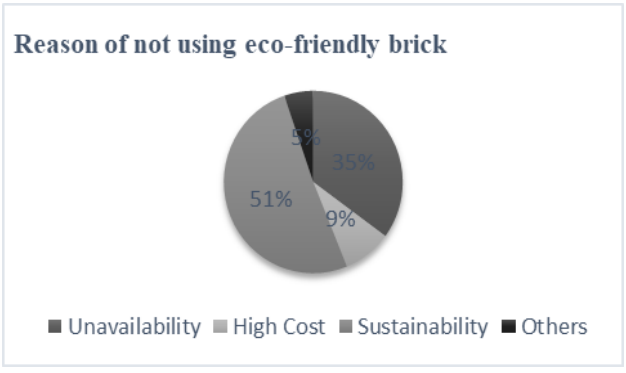

Figure 3: Reasons of not using eco-friendly brick

Though the mentioned problem of kiln owners and buildings owners are less public demand and unavailability which are created a barrier for manufacture of eco friendly brick and use of eco friendly brick among them firstly seem to be contradictory. But, on the other hand both mentioned problem

from group1 and group2 is also complementary to each other. Because building owners dot not have proper knowledge about the eco friendly brick, but who have some idea about it they do not want to use in there building due to doubt on sustainability. For these reason demand is decrease equally which is indicated by kiln owners. Despite of, kiln owners would produce eco friendly brick they must be fall on profit loss. That's why they do not produce eco friendly brick which created the situation of unavailability.

4. CONCLUSIONS

From the study it was found that the drawbacks of production eco-friendly brick are lacking of tecnological support, less supply of raw materials, high implementation cost these for kiln owners. Besides, lack of public awareness, unavailability, doubt on sustainability are the main reasons for fewer use according to kiln owners of the area.

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