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Determinants of Fly Ash Bricks Quality: A Perspective of Consumer

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Abstract. Utilization of fly ash is one of the key concerns for coal based thermal power plants. Fly ash can be utilized in various innovative products and one of them is brick. Demand for bricks is huge and across the country. Despite this, the brick sector contributes only 6.3% of total utilization of fly-ash. The brick sector has huge potential and is required to be explored. From the cost point of view, fly-ash bricks are economical or comparable to clay bricks. From the product point of view, fly ash bricks are expected to be stronger and more durable than clay bricks. It also has smoother surface, lesser seepage and lesser breakage problem than clay brick. Thus technically fly ash bricks are supposed to be superior in quality than clay bricks. However from the point of adoption, quality is subjected to the perception of consumer. Accordingly the aim of the study is to identify the determinants of fly ash bricks quality from the perspective of consumers. The study might assist manufacturer of fly ash bricks, coal based thermal power plants and other agencies promoting fly ash bricks.

Keywords: Determinants of Quality, Perception of Quality, Quality Management, Fly Ash.

1. Introduction

India's energy basket has a mix of all the resources available including renewable. The dominance of coal in the energy mix is likely to continue in foreseeable future. At present India's coal dependence is borne out from the fact that 54 % of the total installed electricity generation capacity is coal based and 67% of the capacity planned to be added during the next Five year, is coal based [1]. Coal-fired power plants generate fly ash. In the financial year 2016-17 it is expected to increase the generation of fly-ash around 300-400MT/year [2]. The large amount of fly-ash generated if not utilized in right quantity will be hazardous to Environment. Fly-ash is a potential source of pollution for the atmosphere and other components of the environment [3]. Dumping in ash ponds influences water and soil [4].

Utilization of fly ash is one of the major concerns for coal based thermal power plants. This is because they are required to achieve 100% utilization by 2014 as per the mandate of Ministry of Environment and Forests by Notification dated 14th September, 1999 [5]. Fly ash can be utilized in various innovative products and one of them is brick. Traditionally bricks are manufactured by small scale units utilizing clay. Fly ash bricks can also be manufactured by small scale industry. As it is scalable it can also be manufactured by medium and large scale units as well. Demand of bricks is huge and across the India [6]. Fly ash bricks can not only satiate that demand but also result in decreasing the environmental degradation and increased fly ash utilization.

Fly-ash bricks are economical and superior to clay bricks. Despite this, the brick sector contributes only 6.3% of total utilization of fly-ash [2]. CEA report further adds that the brick sector has huge underutilized potential [2]. As there is a need to increase the utilization of fly ash, the underutilized potential in the brick sector should be explored and efforts should be made to improve its adoption.

Although fly ash bricks are expected to be superior in quality than clay bricks yet it is struggling for widespread adoption by consumer at many places across India. From the cost point of view, fly-ash bricks are expected to be economical or comparable to clay bricks. From the product point of view, fly ash bricks are expected to be stronger, lighter, and more durable than clay bricks [7]. It is also expected to have smoother surface, better shape, lesser seepage and lesser breakage problem than clay brick. Thus technically

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fly ash bricks are expected to be superior in quality than clay bricks [7]. However from the point of adoption, quality is subjected to the perception of consumer. For this reason there is a need to study quality of fly ash bricks from the perspective of consumers.

2. Objective and Methodology

The study attempts to identify the determinants of quality of fly-ash bricks from the perspective of consumer.

Based on the review of literature attributes of fly ash bricks relevant to quality were identified. The identified attributes of fly ash bricks relevant to quality are Strength, weight, durability, breakage, seepage, smoothness of surface and shape. Accordingly the following hypotheses were developed.

H_o1 There is no significant relationship between strength and quality.

H_a1 There is a significant relationship between strength and quality.

H_o2 There is no significant relationship between weight and quality.

H_a2 There is a significant relationship between weight and quality.

H_o3 There is no significant relationship between durability and quality.

H_a3 There is a significant relationship between durability and quality.

H_o4 There is no significant relationship between breakage and quality.

H_a4 There is a significant relationship between breakage and quality.

H_o5 There is no significant relationship between seepage and quality.

H_a5 There is a significant relationship between seepage and quality.

H_o6 There is no significant relationship between surface roughness and quality.

H_a6 There is a significant relationship between surface roughness and quality.

H_o7 There is no significant relationship between shape and quality.

H_a7 There is a significant relationship between shape and quality.

To test the hypotheses a total of 78 consumers were sampled following the snowball sampling technique. Primary data was collected from the respondents with the help of a questionnaire prepared as per the aim of the study. The collected data were analyzed using Pearson's correlation coefficient. The findings presented here are based on the limited data and analysis done so far.

3. Analysis

The data was analyzed using Pearson's Correlation to study the impact of seven independent variables (strength, weight, durability, breakage, seepage, surface-roughness, shape) upon the dependent variable (Quality).

Table 1. Correlation between independent variables and the dependent variables

		Strong	Weight	Durable	Breakage	Seepage	Surface	Shape
Quality	Pearson Correlation	0.449	-0.13	0.512	0.311	0.382	0.325	0.299
	Sig. (2-tailed)	0.000	0.909	0.000	0.006	0.001	0.004	0.008
	N	78	78	78	78	78	78	78

Pearson correlation was computed to find out the relationship between independent variables and the dependent variables. Results indicated there is a significant relationship between strength, durability, breakage, seepage, surface-smoothness and shape with quality as the p-values are lesser than 0.05. Hence the null hypothesis H_o1, H_o3, H_o4, H_o5, H_o6, H_o7 are rejected at 0.05 level of significance and alternate

hypothesis are accepted. For hypothesis H2 (light weight) the p value is higher than 0.05, and thus the null hypothesis H_o2 is not rejected. It was further analysed based on rules of thumb about Correlation Coefficient Size (r). The association of *Quality* with two variables *Strength* and *Durability* are moderate ($0.4 < r \leq 0.7$). Association of remaining of four variables *Breakage, Seepage, Surface-roughness, Shape* are small but definite ($0.2 < r \leq 0.4$).

4. Conclusion

The preliminary findings indicate that out of seven determinants of the quality of fly ash bricks studied, six (strength, durability, breakage, seepage, surface-smoothness, shape) are found to be significantly related with the perception of quality of fly ash bricks as p-values were found to be less than 0.05. Further strength and durability are found to have moderate association with quality and other determinants have small but definite association. The findings might aid in developing fly ash bricks promotion strategies and activities. Thus it might assist manufacturer of fly ash bricks, coal based thermal power plants and other agencies promoting fly ash bricks.

5. References

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