

An Analytical Study on Production Cost of Brick Industry with Considering Social Cost and Benefits: With special reference to Western Uttar Pradesh (India)

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ABSTRACT

Purpose: Brick Industry is the major participant in the informal sector of India, operational as small scale industry in utmost in rural or semi-urban areas. In this study, researcher tried to conduct an economic analysis of this industry while considering social cost and benefits. The purpose of this study to conduct production cost analysis because of determination of selling price of bricks in western Uttar Pradesh. **Methodology:** The present study is based on primary and secondary data. Primary data have been collected through interpersonal interview guided by structured questionnaire with the entrepreneurs, employees and working labour in brick industry. An Excel tool, Ratios, have been used to analyse the data. This study is confined to western Uttar Pradesh region; researcher surveyed 40 brick kilns in different district of western Uttar Pradesh out of which 5 years data (2016 to 2020) of 20 brick kilns are used for analysis purpose. **Findings:** Social Cost: Out of total registered brick kilns Western Uttar Pradesh, 60% to 65% are using traditional technology for brick making like FCBTK which consumes high amount of fuel and resources and highly polluting and they have negative impact on environment and health. Cost Analysis: Brick industry is labour intensive industry and consist approx 33% share of total cost, next fuel is the cost which is approx 30% of total cost. Profit margin of selected units of last 5 years varies in the range of 20% to 30%. The P/V ratio remains in range 25% to 35% with an average of 31.8%. **Implications:** This study, while not entirely revolutionary, constitutes a move to profound cost benefit analysis of brick industry in Western Uttar Pradesh. **Originality:** till now, no indepth study on cost analysis of brick industry has been conducted in Western Uttar Pradesh region.

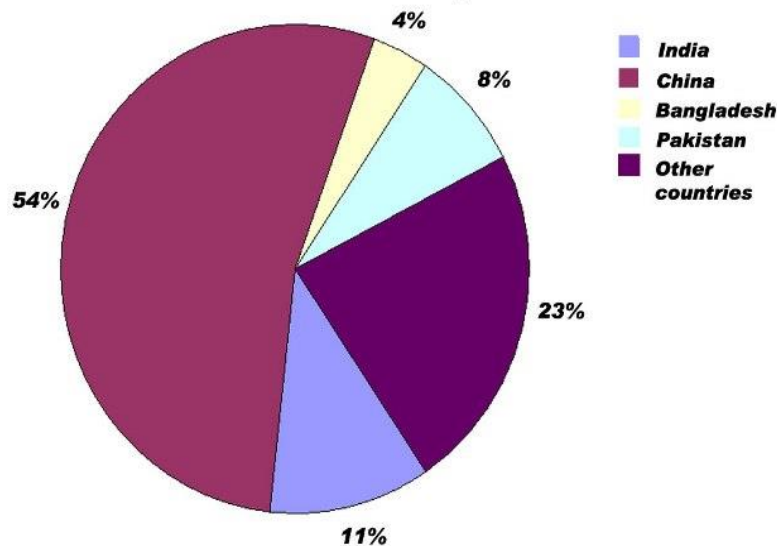
Keywords: Cost analysis, labour intensive, informal sector, environment, pollution.

INTRODUCTION:

Brick is one of the oldest and essential material for construction. Even, in present time there is no substitute available of brick for construction. This is relatively cheap to make, very durable and require little maintenance. Bricks are usually made of kiln-baked mixture of clay. In ancient times, bricks were made of mud and dried in the sun but later, bricks were made of clay and fired in kilns to create strong, lasting material. Normally, brick contain these ingredients sand, clay, lime, iron oxide and magnesia. Brick kiln industry in India is the small scale industry utmost in rural areas or semi-urban areas which compete with each other at regional level. India is the second largest brick producer in the world next to China and has more than 1,50,000 registered and unregistered brick kilns. India has more than 10 percent of global demand and is the second largest manufacturer of fired clay bricks. India, which produces about 150 to 200 billion bricks a year, hires around 10 million employees and consumes around 25 million tonnes of coal per year, is projected to be more than 100 000 brick-kilns.

Indian Brick Industry:

The Indian construction industry contribute about 10% of the GDP with annual growth of approx. 9%. Brick industry in India, is unorganized sector still it is tremendous in sized and spread. The demand for brick is increasing constantly due to increase in population, increase in per capita income, improved economic growth, rapid urbanization, infrastructure development and various housing project schemes sponsored by Government. Indian brick industry is also provides employment to approx. 8 million people at rural and semi – urban level which is just next to agriculture sector. Brick industry also provides employment to large no. of migrant workers including both men and women; most of them reside in the precincts of brick kiln or in shelter homes with their family provided by employer.

Figure: 1**Share in world brick production**

Source: Ecobrick.in

In the above figure, India's share is given which is approx. 11% of the world brick production whereas China's share is approx. 54%.

Production process and ingredients of brick making:

In present time, various techniques are used for making brick but a general process involves four steps. 1. Preparation of brick clay or brick earth: 2. Moulding of bricks 3. Drying of bricks, 4. Burning of bricks.

Techniques Used for Production Process:

1. Fixed Chimney Bulls Trench Kiln (FCBTK): This is most common technique in India, it covers 60-65% production of total brick production. Approx. 40,000 FCBTK units are operational in India. It's capacity range 20,000-60,000 bricks per day. It requires initial investment to set up FCBTK approx. Rs. 25-45 lacs.
2. Zigzag Kiln- this technology was introduced in 1970s by central building research institute (CBRI). It is an advance version of FCBTK say improved version of FCBTK. Its capacity range 20,000 – 60,000 bricks per day. According to CBRI. It consumes 25-30% less fuel with improved production quality but it require more initial investment than FCBTK which range Rs. 60-80 lacs. In India, approx. 4000-5000 Zigzag kiln are operational.
3. Vertical Shaft Brick Kiln (VSBK): this technique is not popular in India. But still approx. 100-120 VSBK are operational in India. Its production capacity is generally low i.e. 5000-20000 per day but consumes 30-40% less fuel, less fuel, and less initial investment in comparison to FCBTK.
4. Tunnel Kiln: this technique is developed in Germany. In India, very few units are there say 5-8 units. It requires large amount to setup tunnel kiln approx. Rs. 5-10 crore. Its production capacity range between 50000-200000 bricks per day and can be operated whole year with a flexible production capacity, different types of bricks, hollow blocks, tiles can be produced with 100% quality production at very low pollutant emission.

REVIEW OF LITERATURE:

1. Factors affecting labour productivity in the brick industry, (Rahul S. Chaudhari, 2014), researcher considered two brick kiln in his study for analysing the productivity of labour. It was observed that some factors affect

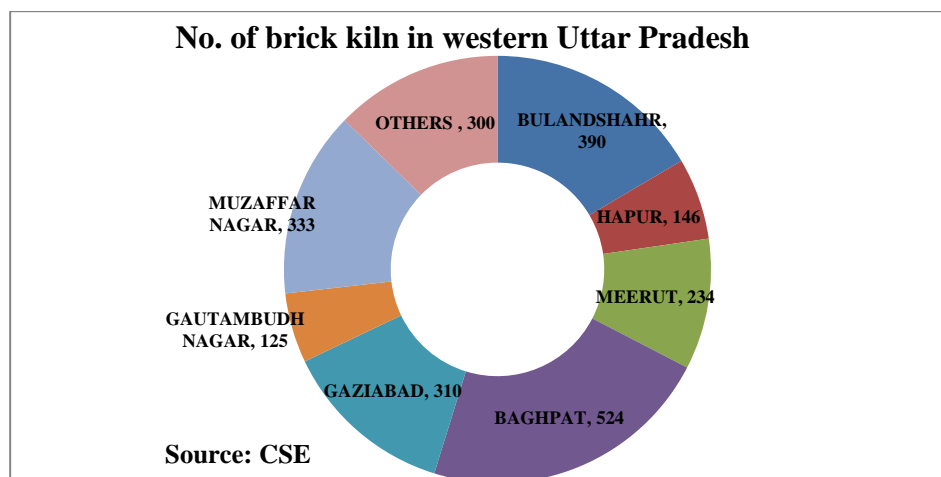
- the productivity of the labour. In this study, researcher concludes that the impact of labour force skill on productivity was 55% averagely. It shows that the labour must be skillful. Workforce play important role for brick production.
2. Productivity and Competition in India's Brick Industry, (Keniston, 2020), he undertaken in his study the productivity and competition in India. He collected data across the country and studied, he found there were very much variability in productivity of this industry. Researcher concluded that brick firms can increase their productivity and profits by upgrading technology.
 3. Benefits and costs of the informal sector: the case of brick kiln in Bangladesh (Lelia Croitoru, 2012), they concluded that, In Bangladesh, Brick sector is informal sector and producing bricks using outdated technology with low energy efficiency and high pollutant emission. In this study they also concluded that brick making using traditional technology is more profitable. However social cost like air pollution and CO₂ emission are factor which is undesirable for society. They recommended that traditional brick kiln should be replaced with cleaner technology.
 4. Competitive analysis of the Turkish brick industry – a case study from developing country (Emel Laptali Oral, 2007), they undertaken in their study, factors affecting the competition in brick industries in developing country within the frame of Porter's five forces model and concluded that existing companies in Turkish brick industry fierce with many similar type of companies.
 5. Impact of brick kilns industry on environment and human health in Pakistan (2019), in this study, Researchers recommended that new technology should be used instead of tradition technology of brick making to reduce harmful impact on environment and health.
 6. Securing the environment: Potentiality of green brick in Bangladesh (Abdullah, 2012), concluded in their study that Bangladesh should adopt green brick technology with the promise to protect the environment against damage done by traditional brick technology.
 7. Environmental cost of using top soil for brick making: A case study from Tamil Nadu, India, (Vinish kathria, 2014), they found the crop yield loss due to top soil removal is much less than expected due to more fertile soil in the region.
 8. Labour productivity, energy intensity and economic performance in small enterprises: A study of brick enterprises cluster in India (Hillemane, 2006), he concluded that labour productivity efficiency has negative impact on energy cost therefore those enterprises have higher labour productivity had lower average energy intensity and higher return as compared to those that had lower labour productivity.

METHODOLOGY:

The present study is based on primary and secondary data. The secondary data have been collected from various sources like published articles, various websites of Government, newspapers, books, survey reports etc. Primary data have been collected through interpersonal interview guided by structured questionnaire with the entrepreneurs, employees and working labour in brick industry. An Excel tool, Ratios, have been used to analyse the data.

Study area and sample units: The researcher conducted field survey in the region of western Uttar Pradesh. There are approx. 2200 brick kiln in western Uttar Pradesh out of which approx. 600 (30% of total brick kiln in western Uttar Pradesh) are in district Baghpat.

Figure: 2



A total of 40 brick kiln surveyed in 4 district of Uttar Pradesh out of which 4 are producing bricks using zigzag technology and rest are using FCBTK. An anylysis of production cost was performed using data of 20 sample units out of 40 which was collected through inter-personal interview with help of well-structured questionnaire. The average production capacity of is about 28000 bricks per day of different variety like- avval, soyam, doyam etc. Brick kiln remain engaged in production of brick 6-7 month in a year which is January to July.

OBJECTIVES:

- ☐ To analyse the production cost and determination of selling price of bricks in western Uttar Pradesh.
- ☐ To see the impact of brick kiln chimneys on environment and other social cost to society.
- ☐ To know the working condition and living status of workers in brick industry.

Cost Analysis of Brick Industry:

Cost analysis here means breakup of overall costs. Each industry has a specific cost in its manufacturing process. Cost analysis mainly focuses on quantitative data to measure the cost – output data. Brick Industry in western Uttar Pradesh generally adopts traditional method of brick making, in such method no machinery and electrical equipment is required, so while keeping in mind this, production of brick is done through manual labour which require approx. 1/3rd of total cost that's why it said brick industry is labour intensive industry. Various costs are incurred while making brick. The cost includes material cost, wages, fuel, other direct expenses which directly associated with the production and other indirect expenses like, salary of munshi (accountant), office and administration expenses, stationary, etc.

Classification of cost by nature: Direct Cost: Direct costs are those cost which are directly associated with the manufacture and easily identifiable. Direct material, direct labour, and other direct expenditure comes under direct cost while taking all direct cost together is becomes prime cost.

Indirect Cost: Indirect costs are those cost which are not directly associated with the manufacturing process.

Direct cost	Indirect cost
i. Raw Material	Salary of Munshi (Accountant)
❖ Soil	Salary of others like Peon, security guard, assistant etc.
❖ Sand	Office expenses like electricity exp etc.
❖ Husk of paddy	Basic aminities to labour
ii. Wages	Selling expenses etc.
iii. Cost of coal	
iv. Cost of fuel (other)	

Source: survey

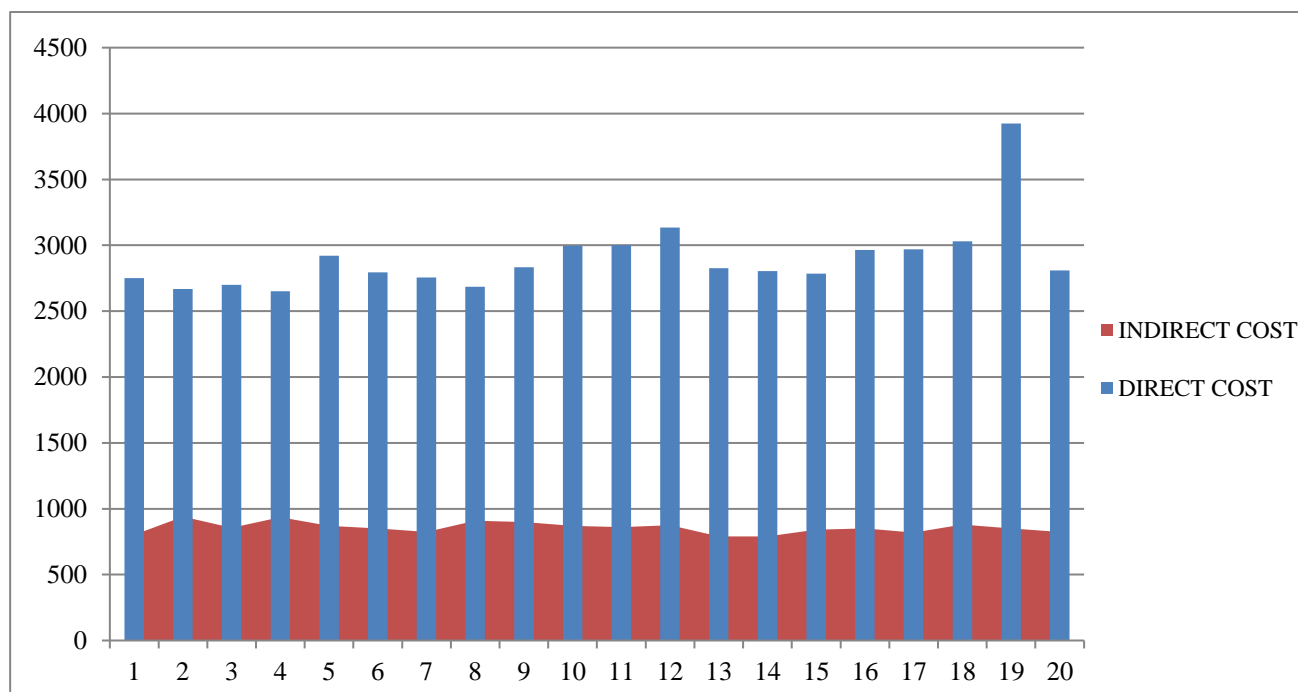
Table 1: Analysis of Production cost of Brick Industry in Western Uttar Pradesh for the year 2020

Sr. No.	Particulars	Average Cost In Rs.	% of total cost
1.	Raw Material	679	15.77
2.	Wages	1430	33.23
3.	Fuel and other direct expenses	1135	26.37
	Prime Cost	3244	75.38
4.	Factory expenses (Basically kiln)	415	10.36
5.	Other Production Costs	644	14.96
	Total Cost	4303	

Source: Personal Survey

The above analysis is based on data collected from 20 sample units (average mean of 20 sample units) through inter-personal interview. The above cost per thousand bricks i.e. Rs. 3705 per thousand or Rs. 3.70 per brick, out of which total direct cost is approx. 77 percent of total cost. Mainly incurred on labour which is approx. 28 percent of total cost which clearly indicate that brick industry is labour intensive production process. Apart from this, fuel has significant share of total cost, coal is the main fuel used in production. As per report of TERI, about 16 tons of coal is required to produce 1 lakh bricks, diesel is also required to run DG set.

Chart 1: Proportion of Direct cost and indirect cost in total cost.



The above bar chart shows the direct cost and indirect cost proportion in total cost.

On the basis of above chart, it is found that approx. 75% in each unit is direct cost and all direct cost is the nature of variable cost while indirect cost is approx. 25% which consist both fixed and variable cost. Fixed cost like-salary of munshi (accountant), peon, guard, etc.

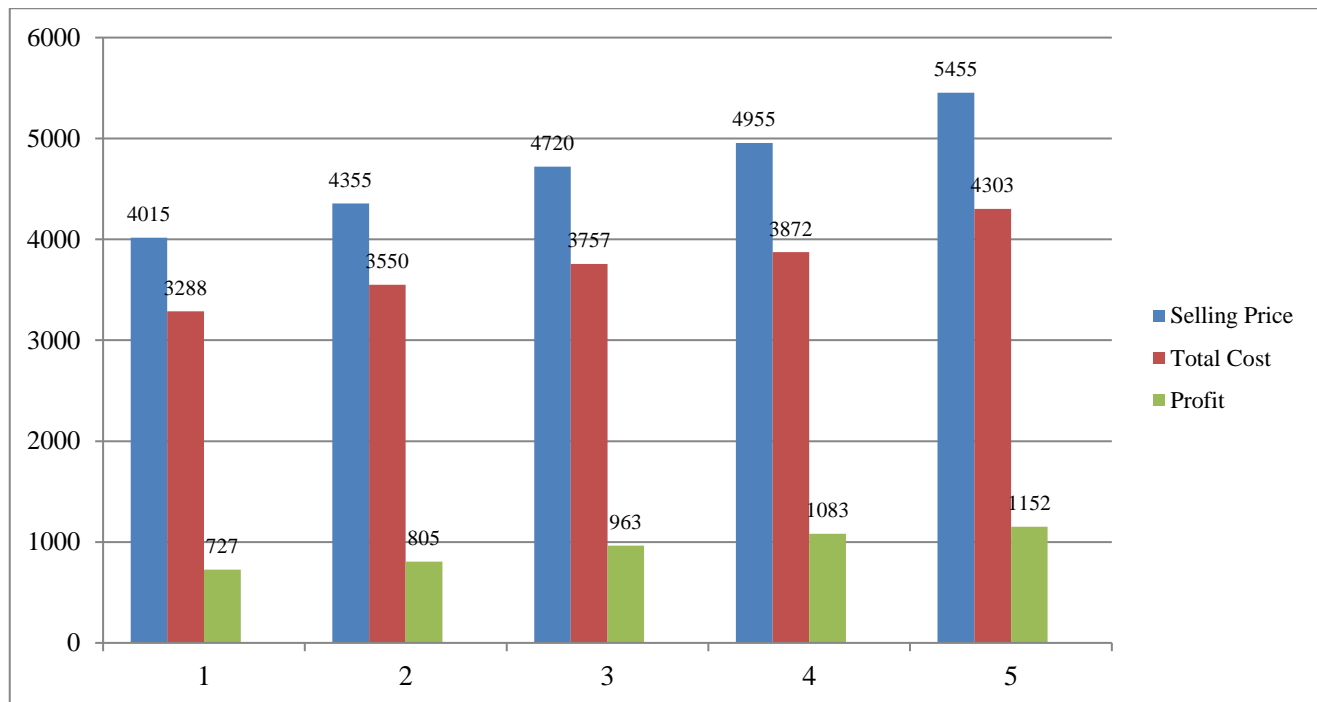
Direct cost ratio to indirect cost = 3.32:1

Table 2: Profit statement with P/V ratio

	2016	2017	2018	2019	2020
Fixed Cost	464	533	564	581	645
Variable Cost	2824	3017	3193	3291	3658
Total cost (A)	3288	3550	3757	3872	4303
Cost per brick	3.28	3.55	3.75	3.87	4.30
Selling Price per thousand (B)*	4015	4355	4720	4955	5455
Profit (A-B)	727	805	963	1083	1152
Profit %	22.1%	22.6%	25.6%	28%	26.7%
Contribution (Per thousand) (Selling price – Variable cost)	1191	1338	1527	1664	1797
PV ratio	29.6%	30.7%	32.3%	33.5%	32.9%

* Price of bricks is determined by the brick kiln owner individually i.e. there is no mechanism for determination of price; however most of the time price of bricks fluctuates due to demand and supply of brick in the society. In the above statement, it has been seen that prices of bricks increasing constantly due to various reasons like- urbanisation, increase in population, increase in cost of production etc. The above statement also shows the margin of brick industry on the basis of past 5 years data. Average profit margin range of brick industry varies 20% to 30%.

Chart 2: Average total cost, sale and profit per 1000 bricks



The above chart shows the margin and total cost of brick industry for 1000 bricks for past 5 years. Data have been taken for analysis from 20 brick kiln through well-structured questionnaire and inter- personal interview. Respondents were brick kiln owner, employee and worker working in brick industry.

Impact of brick kilns on environment:

In western Uttar Pradesh, more than 2000 brick kilns are registered and operational and out of which approx. 85% brick kilns are using traditional brick manufacturing technology i.e. FCBTK. FCBTK is highly resource consuming and extremely polluting technology. The burning process of bricks uses coal as fuel which emits toxic fumes containing carbon monoxide and SO_x that are harmful for eyes, lungs and throat. SO_x is the major pollutant in the air. Brick kilns chimneys emit SO_x pollutant next to emission from vehicle. Brick industry uses top quality of soil as raw material for making brick which reduce the fertility of the land, in extreme cases land does not remain fit for agriculture purpose. But now, entrepreneurs are shifting to various new technologies like zigzag, VSBK etc. that consumes less fuel, highly efficient and very less polluting.

Health and living status of worker in brick industry:

Brick industry is highly labour intensive industry and provides employment opportunities to people living in rural and semi-urban area, approx. one third of total cost incurred on wage payment to labour. Working hours in brick industry found longer but still they are not getting fair wages, brick owners do not provide basic amenities to worker such as first aid, pure water, electricity, kitchen, bathroom facility. Brick industry is most polluting industry in the country, workers those work in brick kiln faces many health issues such as skin diseases, respiratory disorder, eye problems etc.

CONCLUSION:

Brick industry in western Uttar Pradesh plays significant role by providing bricks which essential material for construction. Approx. 85% brick kilns in western Uttar Pradesh making bricks through FCBTK which is highly resource consuming and extremely polluting but now, brick kiln owners are moving to zigzag and other new technologies which emit less pollution and highly efficient. Brick industry is highly labour

intensive in which wages having share approx. 33% of total cost equivalent to fuel cost. Direct cost ratio to indirect is about 3.3:1. Profit margin of brick industry remains in range of 20% to 30% in past 5 years. The prices of bricks decided by the brick kiln owners individually i.e. there is no mechanism for determination of prices, however most of the time prices fluctuate due to demand and supply of bricks in the society. Brick industry provides employment opportunities to many people but the condition of worker engaged in brick industry is critical, they are not getting fair wages, face various health issues. In this study, it is found that brick industry has its own numerous benefits while society has to face various challenges due to emission from brick kiln chimneys. Brick is essential material for construction and this sector has contributed a good percentage in GDP and economic growth of the country but still this sector is unorganized and ignored by Government. Government should recognize this sector as formal and make various norms to regulate this industry. Apart from this, entrepreneurs should adopt new technologies for brick manufacturing so that pollution emission can be reduced and productivity and efficiency can be increased.

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