

STAGES OF PRODUCTION: AN ETHNOGRAPHIC STUDY IN A CLAY BRICKFIELD IN NORTH 24-PARGANAS, WEST BENGAL, INDIA

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ABSTRACT

In India, the use of fired bricks belongs to Indus Valley Civilization. Since then the tradition of using fired bricks being followed in India to enhance the durability and strength of any construction. Presently like other states of India in West Bengal, fired bricks are in use for construction purpose. Bricks are generally being produced locally in industries and small enterprises in villages of rural Bengal. The present study had been done in a small enterprise called Sadarpur Brick Field (SBF), which is situated under the village, Sadarpur under the Icchapur-Nilgaunj Gram Panchayet, Barasat Block-II, in the District of North-24-Parganas, West Bengal. In the said enterprise the labourforce employed in the production of bricks is mostly local. But for the firing of the bricks, migrated labours, especially from Gujarat, Rajasthan is being preferred for their efficiency as well as skill in the concerned sector. Through the present study, it had been observed that different operational stages were involved in the production of fired clay-bricks. The present study is basically an ethnographic profile of the stages of brick production ranging from 'Soil collection' to 'Selling and transportation of bricks'. Through the present study, the organization of production on and the issues are related to the processes of the units of production and allied division of labours had also been observed. The empirical data had been collected through Participant Observation, supplemented by Intensive Interviews with the association of Questionnaires.

Keywords: Clay bricks production, Instruments, Operational stages, Organization of production.

INTRODUCTION

Construction has emerged as one of the important industries involving a large number of workforces (American Institute of Architects, 1998). A wide range of activities comes under construction industry including production of bricks (Bagchi, 2014). To trace back the production of brick it had been found that brick is as old as civilization itself (Campbell, 2003). Brick's production dates back to ancient Mesopotamian civilization about 500 BC.

Archaeological relics of Mohenjo-Daro and Harappa, of 4000 years back indicate well-developed brick production in ancient India (Roy, 2012). With the advent of industrialization and developments, the construction industry is taking a pivotal role and relying on brick production (Bagchi, 2014). Presently after China, Indian brick industry is the second largest in the world (Aswale, 2015). Instead of being second largest industry in the world India's brick industry is characterized by different loopholes including traditional production technologies, dependence on manual labour, dominance of small-scale brick kilns with limited financial, technical and managerial capacity; dominance of single raw material (clay) and product (solid clay brick); and lack of institutional strength for the development of brick industry (A Shakti Sustainable Energy Foundation and Climate Works Foundation, 2012).

There are around 50,000 brick kilns in India, each employing on an average 100 workers each season, most of whom are migrant labourers (Smita, 2007). Presently only the male heads of the family are being registered on the payrolls and payment made to him on a piece-rate basis depending on the number of bricks prepared by him. Since the higher number of bricks would fetch a higher income, the families migrate as a unit and engage all the family members in brick making. A conservative estimate of five members per family provides an estimate of a staggering 25 million people dependent on the brick kilns for their livelihoods, roughly two-fifths of whom are children between 6-14 years of age (Majumder and Mukherjee, 2012).

Brick production falls within one of the traditional industries in the Indian state of West Bengal. Most of the brickfields in Bengal had been set up more than two centuries back. Since the beginning of the colonial period in Bengal, many significant structures including the structure of Fort Williams, represent the prevalence of brick under the construction industry in Bengal (Roy, 2012). A wide range of activities is involved in it. Due to the advent of industrialization and recent developments, the construction industry is taking a pivotal role for the construction of buildings, roads, bridges, and so forth (Bagchi, 2014). In West Bengal, around 3500 brick manufacturing units provide employment (officially) to more than 0.7 million people. The silted topography of West Bengal is uniquely suited for making bricks. In the past, the riverine delta region of South Bengal provided quality-soil as a cheap source of raw material and the in-land canals functioned as the mode of low-cost and easily accessible local transport. As the city Kolkata grew in size, the hinterland of the city became suitable locations for brickfields which include the districts of Howrah, Hooghly, South and North 24 Parganas (Roy, 2012).

OBJECTIVES

- To explore the sources and types of raw material being used for the production of bricks.
- To have an insight into different stages of brick production

- To understand the involvements of different kinds of labourers in stages of brick production.

STUDY AREA: The present field study has been carried out in the Sadarpur Brick Field (SBF) of Ichapur Nilgunj Gram Panchayet, which comes under the Police Station- Jagannathpur, Barasat Block-II of North 24 Parganas, W.B. The studied brick field is located beside the Barasat-Barrackpur road. The brickfield is 4.5 km away from Barasat Junction railway station and 7 km away from Barrackpur railway station. To be specific S B F shares boundary with Karim Box Mondol (KBM) Brick Field to the north, Barasat-Barrackpur road to the south, Puspakalaya flat to the east and Jagannathpur village to the west. The actual land area of the brick brickfield is 12 Bighas i.e. around 4 Acres. But the action area of the present brick filed excluding residential area, spread over 7 Bighas of land.

METHODOLOGY

The empirical data had been collected after field survey during November and December 2017. The study had been done through Observation, supplemented by Intensive Interviews. As the interview tool Semi-structured Schedules were also in use. Secondary data had also been utilized following books and journals.

During the survey, the organizational division of the labour force had been studied by using an integrated approach of group discussions and interviews with the help of semi-structured schedules. Information regarding the stages of brick production was collected from key informants, through intensive interviews. The men and women involved in different operational stages had been chosen as key informants for the purpose of the interview.

It is worth mentioning that some problems were faced due to less availability of informants due to their business at daytime, to avoid such problems sometimes survey conducted after the working hours i.e. after 5 p.m., with informed consent.

Even though some of the workers especially who were involved in 'firing of bricks' were unwilling to provide the information about their knowledge regarding brick production as they were afraid that sharing of their knowledge could hamper their practice as more local workers may intrude into their profession.

Sometimes owner was annoyed due to the way survey was being done, as he might be suspecting of the unveiling of some controversial issues associated with the brickfield and he was also bothering about the delay in conducting work due to attaining interview by some of the labourers.

RESULTS AND DISCUSSIONS

The studied brickfield is locally known as the ‘Sadarpur Brick Field’ or ‘SBF it-bhata’. Most of the workers employed in the studied brickfield are migrants and they are engaged on contract basis. In the brickfield, Brick production found to be a seasonal activity. The workers involved in the brick field are mostly local, while some are from other districts and some of the workers are from other states. Many of them were landless farmers. The seasonal migrant worker living in the brickfields throughout the period of six to eight months during production season and returns back to their home after the production season comes to close in the rainy season. In SBF others state’s workers are from Bihar, Jharkhand, Uttar Pradesh, Rajasthan and Gujarat. Most of the other state’s workers are specialized in different sectors including firing works. Workers of West Bengal are found to be not involved in firing work.

TABLE 1: AGE AND SEX-WISE DIVISION OF LABOUR

AGE	CHILDREN			
6-12 years	Piling of Soil, Soil preparation			
	BOYS	GIRLS		
12-18 years	Transport, transport	De-	Soft mouldings, Drying	mud
	MALE	FEMALE		
18-50 years	Soil collection, firing, Transport, De-transport	Forming	the brick's shape, Soft mud mouldings	

*Instead of a rough age and sex-wise division workers are being employed to a particular duty as per their efficiency while age division is somehow being relaxed. But in case of sex-wise division of work girls and females can never do soil collection, firing and transport related work.

In the SBF at the time of present study around two hundred workers were engaged of whom seventy were female workers. There the workers involved in Transport and De-transport are from Bihar and Jharkhand. While most of the workers of West Bengal are also involved in Transport and De-transport works. The workers from Bihar also involved in soil processing and they efficiently do the soil processing job. The workers from Uttar Pradesh and Gujarat found to be skilful in brick arranging (within kiln before firing) and the workers from Rajasthan are specialized in firing-work. Sometimes workers from Gujarat are found to involve themselves in firing work

Most of the outstation workers stay in the brickfield's residential area. They mostly come and stay with their family while firing workers don't prefer to come with family. Local workers use to come from their home and they travel and work there on a day basis and they don't involve their family members in brick production work. Workers of other states excluding firing workers, stay with family involve their family members to earn extra or to increase the speed of service. Sometimes wives, sons and daughters of the fulltime workers are being involved in separate works, while sometimes they just support the fulltime workers. Girls and boys below fourteen years of age found to be working as helping hands for their parents. Even involvement of kids, pregnant women, lactating mothers is not an unusual fact in SBF. To have a better insight of the labour-force being employed to the SBF, give a glance at the Table-1, presenting the age and sex-wise division of labour force involved in the SBF.

In the brickfield, work continues from 6 a.m. at morning up to 5-6 p.m. at evening. The whole process of brick production is being done in the brickfield and is splitter into a number of tasks which are being performed sequentially in different locations within the brickfield. The workers engaged in the brickfield are of different types. such as: Pathera- those who mould bricks, Matikata labour- the earth diggers, Taboya- the bearers of mud-filled baskets, Reja- those who carry bricks to the furnace, Bujhai mistri- the workers who arrange bricks in a particular fashion in the furnace, Mati-phulla- the workers who bring prepared soil to the reja for moulding, Bail hakka- the workers who drive bullocks round the mills for grinding soil, and Muh-katta- the workers who collect mixed soil from the open end of the mill.

Most of the workers of SBF get a monthly salary while some, who are involved in 'Manufacture of brick' get wages depending on their work. Any problem in settling salary is being solved by 'Bengal Owner Association'.

RAW MATERIALS:

The raw material which is exhaustively being used in the studied brickfield for brick making is soil. Though soil is naturally abundant as the surrounding area of the studied brick field is fairly

populated and all the open lands come under individual or family ownership, hence for the collection of soil from any spot needs permission against payment. In SBF soil is mostly being collected from nearby Sona Kharki, Borboria and Moyna area. In SBF care is also being given to select the right types of soil for brick manufacture. As per key informants, brick making soils must have plasticity, which permits them to be shaped or moulded when mixed with water; they must have sufficient wet and air-dried strength to maintain their shape after giving the shape. Plasticity of soil also matters when subjected to appropriate temperatures, as the clay particles must fuse together after firing.

In SBF, loamy soil is the most preferred kind of soil to manufacture brick. Sometimes clay soil is also in use. While as per the workers involved sandy soil cannot be used for manufacturing brick.

INSTRUMENTS

In the studied brick field Clay brick making includes several stages and to accomplish those process some fundamental instruments are being used by the labourers. The instruments include- Kodal (Spade), Belcha (Shovel), Pokhmil (Soil processing machine), Katni (Flat cutting ladle), Sanch (Brick manufacturing mould/ Disc), Dhonush (Bend rod articulating with string), Long blade (Katari) e.t.c. These instruments are in use in different stages of brick production.

STAGES OF BRICK PRODUCTION

Soil collection: In the studied SBF necessary soil for brick, production are being collected from nearby villages and sometimes from brick field adjacent open areas. In the collection of soil to brick kiln, some local boys play a major role and act as soil supplier. Bringing soil from different places is entirely their responsibility. To meet the purpose they use Saktiman track. There is a fixed rate for a certain quantity of soil. The manager of SBF used to buy soil from several local soil suppliers.

Piling of Soil: The collected soil is being accumulated into pile or heap (gada) within the boundary of brickfield. There are two different places within the brick field for soil accumulation. One is at the east side of the brick kiln beside a 'Bullock drawing soil processing machine (Pokhmil). While another amass of soil is situated on the west side of the brick kiln, which is huge in size. In the studied brick field heaps of soils were being left after accumulation for one season to soak rainwater.

Clay Preparation: It is one of the important stages in brick production. The succession of brick production depends on the way soils are being prepared. Soils were made into clay for brick production. Clay preparation includes several stages, maintenance of which determines the quality of the brick as the good quality of bricks depend on the physical characteristics of the raw

material and special measures are being taken to deal with certain impurities in the soil. Clay preparation includes of transforming the clay's rocks or into mouldable material by the process of grinding and mixing with water. Typical 'Soil proceeding machines' having a Primary crushers, are being used to break down large lumps of clay rock. Sometimes water is being added to process dry lumps.

Manufacture of brick: Before proceeding for the manufacture of brick the ground, on which just made bricks will be placed is being swept not to allow sticking of any unwanted material with newly made bricks. As mixing of any extra material with processed clay or to newly made bricks can hamper the texture and durability of brick. Before brick manufacture, sands are being spread on the ground not to allow the moisture of the ground to hamper the bricks.

Giving the shape to the Bricks: Bricks are being formed by using some basic processes. Wooden mould is mainly in use the give the brick proper shape. String and or knife are also in use to cut down the extra mud.

Soft mud mouldings: This includes several processes where bricks are formed in mould boxes. There are several processes but all have a common ground. Processed soft clay is being thrown into a mould, mould release material (sand) is being placed before that not to allow the clay from sticking to the box. The excess clay is being struck off from the top of the mould and the bricks are turning out. All of this is being done by hand, by a craftswoman who produces one brick at a time. This is a labour intensive, slow stage. This sort of work is entirely being done by women. Several women were involved in this stage of brick production in the studied brick field.

Drying- Though to drying up bricks heat may be produced form dryer chambers of the kiln. But bricks are being sun-dried even before being brought to the brick kiln to reduce the humidity to allow bricks to be in its given shape. In all cases, heat and humidity must be carefully regulated to avoid cracking in the bricks and to maintain the proper shape.

Transport: Transport is the process of loading a kiln van or kiln with the brick. The number of brick on the kiln van is determined by kiln size. The brick is typically placed manually by labours. Sometimes small vans are being used to serve the purpose. The setting pattern of brick within kiln or kiln van has some influence on appearance or colour of bricks. Bricks placed face-to-face will have a more uniform colour than bricks that are cross-set or placed face-to-back. Such small rules in arranging bricks in the kiln are being followed by the labourers.

Firing: Bricks are fired between 10 and 20 hours, depending upon some factors. In the studied brick kiln two separate kilns (one big and one small) are in use. As fuelwood, coal or a combination of both fuels are using. Bricks are loaded onto kiln mostly manually sometime vans

are in use. Bricks are loaded in such a way that those can allow various grade temperatures. As during firing temperature ups and downs being regulated the firing worker and the firing process goes on meeting the specific conditions of firing. The heating and cooling condition within brick kiln are carefully controlled by experienced labourers, and the kiln is continuously operated by them during the entire process of firing.

As before firing the bricks are being loaded to the kiln then being fired and being allowed to cool and unloaded. In the studied brick kiln it had been found that sun-dried bricks are being set in kilns according to a defined pattern that allows circulation hot gases of the kiln. As per some secondary sources and the owner of SBF firing may be divided into five general stages. Those are as follows:

- 1) Final drying (evaporating free water).
- 2) Dehydration;
- 3) Oxidation;
- 4) Vitrification; and
- 5) Flashing or reduction firing.

As per the information provided during the full process of firing all except flashing are associated with increasing temperatures in the kiln. Although the actual temperature differs with clay types, hence final drying takes place at temperatures up to around 350 °F, dehydration starts from about 250-275 °F to 1700 °F, oxidation starts from 950 °F to 1700 °F and vitrification starts from 1700 °F to 2200 °F. Soil, unlike metal, softens slowly and melts or vitrifies gradually when subjected to rising temperatures. Vitrification permits clay to become hard, solid mass with relatively low absorption capacity. Melting takes place in three stages:

- 1) Incipient fusion, when the clay particles become sufficiently soft to stick together in a mass when cooled;
- 2) Vitrification, when extensive fluxing occurs and the mass becomes tight, solid and nonabsorbent and
- 3) Viscous fusion, when the clay mass breaks down and becomes molten, leading to a deformed shape.

Hence the main concern in the firing process is to control the temperature in the kiln so that incipient fusion and partial vitrification do occur but viscous fusion could be avoided to maintain

the proper shape of bricks. The range of temperature change must be carefully controlled and is mostly dependent on the raw materials, as well as the size of the brick being produced. Kilns are normally equipped with temperature sensors to control firing temperatures in the various stages. Near the end of firing, the brick may be ‘flashed’ to produce colour variations.

Cooling after firing- After the temperature has peaked and is maintained for a certain time, the cooling process begins. Cooling time rarely exceeds 10 hours, but 5 to 24 hours are being taken as the standard time for not causing any disturbance to bricks. Cooling is an important stage in brick manufacturing because the timing of cooling has a direct effect on hardness and colour of bricks.

De-transport- De-transport is the process of unloading a kiln or kiln van after the bricks have cooled. It takes 3-4 days to get the bricks properly cooled. At SBF after firing at least three days are given for cooling of bricks. After that, the De-transport work from the kiln is being done by labourers. As the job mostly was being performed manually, hence men with good physical strength are being employed. For this middle-aged male are most preferred. Sometimes small van is also found to be in use for De-transport. Within De-transport process, bricks are sorted, graded and packaged. At the end of De-transport bricks are placed in a storage yard or being loaded onto van or trucks for delivery.

Selling of bricks- Bricks are being sold in nearby areas and also in adjacent town and cities. Sometimes orders are received from distant areas when transport cost is paying by the customer. Bricks have been selling by the SBF are being used in the construction of buildings, roads, bridges, and so on. As per the informants interviewed bricks of poor quality are being preferred by for public construction purpose, such as for flats to minimize the expenditure. High-quality bricks are being bought by private owners for individual constructions say for homemaking purpose. A chart on category and respective price of bricks is given in Table-1.

TABLE 1: CATEGORY AND PRICE OF BRICKS

	Category	Price (in rupees)
1	Very good	10
2	Good	7
3	Medium	5
4	Low	3-4

ACKNOWLEDGEMENTS

Author expresses a deep sense of gratitude to the labourers of SBF, especially to the key informants for their valuable information and generous support during the survey period, special thanks to the owner of the brick kiln Mr Shreepati Dutta, as he provided with the permission to collect information. Author is also thankful to the local Gram Panchayet officials for providing supports for conducting this study. Lastly, author would like to express her deepest gratitude to the concerned authority of West Bengal State University) for giving the opportunity to conduct such study.

CONCLUSIONS

The present study states that the production of brick is a labour intensive one and would need full commitment of producers and beneficiaries in ensuring that they meet the targets on a daily basis for them to generate workable profit. However once the workers of skilled sectors of the brickfield have received sufficient and required training working as trainees under veteran workers, they would have minimal technical challenges to achieve the desired target. As per the veteran workers, work tradition is also a factor. They say as the labourers from north-west India, especially from Rajasthan, are being considered as well equipped in firing works of bricks due to the involvement of their forefathers in the concerned sector. Apart from that, it is evident that the unskilled labourers of all age groups are participating in brick production. In the process they would equip themselves with skills at the same time there are huge provisions for unskilled workers irrespective of age and sex to generate income. Child workers are being involved with an addition of pregnant women and lactating mothers, which must be avoided both the part of employers and the family members.

Apart from these in the studied SBF some other issues must be revise which are including less use of technologies, old production technologies, reliance on manual labour, limited financial, technical and managerial capacity; prevalence of single raw material i.e. clay and single kind of output i.e. solid clay bricks and lack of organization for the development of brick the concern enterprise. In the present studied brick field, it had also been found that though the fundamental techniques of brick manufacturing have not changed over time. However, some sort of technological implementations in the present brick field has turned its contemporary brick making process substantially more efficient and by which the overall quality of the outcome products i.e. bricks, have improved. A more complete knowledge of raw materials, their properties, better control of firing, improved kiln designs and more advanced mechanization have all contributed advancing production while more technological and experience based efficiency, enhanced quality of raw-material and instruments can advance the production further.

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