
FINAL REPORT
ON
BASELINE SURVEY OF COMMERCIAL BUILDERS, PRIVATE
BUILDERS AND ARCHITECTS

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DEFINITIONS AND ABBREVIATIONS

Bangla bricks	Bricks made by hand and burnt in fixed chimney kilns (FCK)
Machine made bricks	Bricks made by machines and burnt mostly in Hoffmann kilns
Hollow clay bricks	Made in similar way as machine made bricks. In project these are defined as (a) Load bearing bricks that contain perforations that are round or rectangular usually about 20-35% hollow, (b) non-load bearing bricks that have rectangular openings usually the hollow portion is between 35 – 50%
Picket	Term locally understood as over burnt bricks used for making gravel
Hollow concrete blocks	Concrete blocks made by machine having rectangular holes extending from top to bottom of the block
Embedded energy	Embedded energy of a material is the total amount of energy used in manufacture, transport, storing and assembly including its heat content
Standard deviation	The amount of variation from the mean (average) within a single data set. The greater the standard deviation, the greater the range (difference between the highest and lowest values) of values within the sample.
Life time maintenance	Total amount of maintenance done in the life time of a particular building
Commercial Builders	Builders who make commercial or apartment buildings for sale
Private Builders	Persons who build their own buildings themselves or through contractors under their own supervision
GTZ	German Technical Cooperation
FCK	Fixed Chimney Kiln
PWD	Public Works Department of Bangladesh
LGED	Local Government Engineering Department of Bangladesh
R&H	Road and Highways Department of Bangladesh
REHAB	Real Estate & Housing Association of Bangladesh
CEA	Clean Energy Alternatives
TOR	Terms of Reference
GDP	Gross Domestic Product



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EXECUTIVE SUMMARY

Background

As part of its overarching Energy Efficiency program in Bangladesh, GTZ recently initiated a demand side barrier removal project that is expected to promote the use of hollow clay bricks in Bangladesh. In so doing, the project aims at lowering the energy intensity of bricks and introducing energy efficient practices in the downstream construction industry. Brick making operations in Bangladesh, which are mostly within the informal SME sector, do not have strong market or regulatory motivations to be more energy efficient nor does the building industry even though the latter is a large and formally organized industry. In addition to these factors, knowledge and exposure to technology changes is almost absent, limiting the technology choice portfolio for making bricks. Business as usual is the paramount characteristic of the industry.

The project, under GTZ contract number 83018507, intends to eliminate/reduce demand side barriers that have jointly and severally prolonged energy inefficient practices in the core element of the supply chain of the construction industry namely bricks. These barriers have created a vicious cycle that can only be broken by a concerted holistic set of interventions. Hence, on the supply side, a UNDP GEF project has been initiated to disseminate a Hybrid Hoffmann kiln technology to make brick kilns energy efficient and, on the demand side, awareness building, managerial and technical capacity development and the promotion of green housing codes are expected to promote the use of resource friendly hollow clay bricks.

Baseline Survey Design

As a first step in the intervention strategy a Baseline Survey of Commercial Builders, Private Builders and Architects was initiated to test the existing state of knowledge and the parameters implicit in the design of the interventions. A survey of present practices, the state of the industry, future trends, energy efficiency and environmental awareness was conducted from among a random sample of Architects and Commercial and Private Builders in and around Dhaka City. The questionnaires were also designed to discern attitudes of the target population with respect to solid bangla bricks, solid machine made bricks, hollow clay bricks and hollow concrete blocks, these being the distinguishable competitive products. Of these, bangla bricks are produced by hand and fired in highly energy inefficient kilns that date back hundreds of years. .

Baseline Indicators

Five baseline indicators were selected. The indicators are:

- “Overall Use of Hollow Clay Bricks”;
- “Comparative Use of Different Type of Bricks”;
- “Knowledge and Skills in Laying Hollow Clay Bricks”;
- “Availability of Hollow Clay Bricks”; and,
- “Reasons for Not Using More Hollow Clay Bricks”.

The value of these indicators will change with the successful implementation of the project.

FINDINGS

The findings of the survey are summarized below:

Market

The brick market appears to be largely a segmented one, market behavior and characteristics being clearly defined by the product type. The usual practice of consumers, particularly bulk buyers, is to buy from pre-selected suppliers with whom they have done business in the past and who have proven to be dependable. New entrants must prove their credentials, which is mostly determined by price competitiveness. Factors generally influencing buying decisions are: brick strength, brick size and availability or what is referred to as “timely delivery”. A quarter of the builders expressed dissatisfaction with size specifications that is the bricks supplied often does not measure up to the specifications bought. This is also a major factor in determining supplier selection. The survey found that a greater majority of consumers get timely delivery. This is to be expected since construction activity follows the brick making season, most buying taking place during the height of the production cycle when supply is abundant. Pre-payment is the norm. More than half of the respondents indicated that they make payment prior to supply.

Availability

“Bangla bricks” and “pickets” (bricks that over-burn in the firing zone), defined for project purposes as bricks made by hand and fired in the tall fixed chimney kilns (FCK) are available in “sufficient” quantity. Machine made bricks, hollow clay bricks, and hollow concrete blocks are not sufficiently available as the demand for them is higher than their supply. A statistically significant number of builders, however, indicated that even if the supply of modern machine made bricks were to be augmented they would be reluctant to increase their consumption. They cited insufficient strength, leakage through utility lines embedded in walls made by machine bricks, non-availability of skilled masons as the major reasons influencing their choice,

Building Industry Practices: Demand analysis

Market demand: Most of the Bangla bricks produced are used for “soling”, a common term meaning the base platform on which concrete is poured for foundations or simply left exposed as in some types of road construction. The next large use is as a wall material for outer and inner walls of buildings and in boundary walls. In smaller, non-frame houses, the outer walls are load bearing. Machine made bricks and hollow concrete blocks are used mostly as wall materials for both outside and inside walls. Hollow clay bricks are used mostly for inside walls.

Market size: In terms of percentages, Bangla bricks have the largest share of the market followed by machine made solid bricks then perforated hollow clay bricks and lastly by hollow concrete blocks. This follows the classic case of supply determining demand or more appropriately usage since almost 90 percent of bricks produced are bangla bricks..

Demand variables: The survey indicated that price is the major determinant of demand. Bangla bricks prices are the lowest among the types surveyed. It is interesting to note that buyers do not distinguish between brick sizes. Bangla bricks are significantly smaller than machine made bricks, about 11% smaller on average yet this is not factored into relative price comparisons. A rational buyer would make an allowance for this factor in calculating costs but in Bangladesh because of the informal nature of business transactions these hidden costs remain unaccounted for. Other factors affecting demand are the nature of transactions and supply considerations. Bangla bricks are usually sold on credit terms and, as noted before, they are readily available in large quantities. In the case of machine made bricks, demand is influenced by quality of the product, its good shape, good finish and aesthetic beauty; the higher price of machine made bricks being compensated by these factors. The demand for hollow perforated clay bricks arises from its niche market situation; it is considered a “fashion” product and used sparingly. It is the most expensive of all brick types. Its lighter weight, good insulation properties and higher strength make it more desirable.

Factors affecting demand for hollow concrete blocks are: the lower cost in “finishing” the walls that is the less use of cement in plastering; lower labor cost associated with wall construction and cementing walls; speedier wall construction; they contain less salt and hence have low effervescence; and their lighter weight.

The major factor dampening demand for bangla bricks is the inconsistency in its shape and size, each brick is unique, and no two bricks are alike. For machine made solid and hollow clay bricks, the major factors are supply shortages and their high price relative to bangla bricks whilst those for hollow concrete blocks are their lower strength properties, inadequate supply and high price.

Comparison of Final Costs associated with Different Brick Types

Cost of labor associated with laying bricks is highest for bangla bricks whilst that with hollow concrete bricks is lowest. Similarly, use of cement and mortar in wall construction is highest with bangla bricks and lowest with hollow concrete bricks. In addition, the highest wastage during construction is with bangla bricks followed by hollow clay bricks then machine made bricks and then hollow concrete blocks.

Time used in construction, a cost factor, shows that bangla bricks takes the longest time to lay followed by machine made bricks then hollow clay bricks and then hollow concrete blocks. Costs associated with finishing walls constructed with bangla bricks are highest, followed by machine made bricks then hollow clay bricks and then hollow concrete blocks. Cost of laying utilities with bangla bricks is perceived as highest, followed by machine made bricks then hollow clay bricks and then hollow concrete blocks. Lifetime maintenance with bangla

bricks is perceived as highest, followed by machine made bricks then hollow clay bricks and then hollow concrete blocks.

The analysis of the responses regarding comparative costs show high standard deviation indicating that users and consumers builders do not have sufficient knowledge about comparative costs.

Availability of Skills among Workers

About 90% of the builders think that requisite knowledge and skills for laying of bangla bricks is available. Slightly more than half of the builders think that proper knowledge and skills for laying machine made bricks is available. About two thirds of the builders think that proper knowledge and skills for laying hollow clay bricks and hollow concrete blocks is not available.

Desirable features in different types of bricks

The conclusions that can be drawn from the survey with regard to features desired most by buyers are as follows: price, brick size, shape, strength, color and availability. The surveys show that buyers would like better size, shape and strength than those found in bangla bricks while they consider that their price is within an acceptable range. In the case of machine made bricks respondents mentioned price as the deterring factor but they are well burnt, have more variety and have good color. Most desirable features in hollow clay bricks are low price, year round availability, good strength and variety. Most desirable features in hollow concrete blocks are low price, year round availability, good size and less porosity. Respondents indicated that machine made bricks were aesthetically preferred the most followed by bangla bricks and hollow clay bricks. It is least with hollow concrete blocks

Awareness and Environment

Almost all the builders believe that the present brickfields cause damage to the environment. Almost all would like to see that the manufacturing process should change to make it environmentally friendly. Nine out of ten builders are ready to pay more for the bricks that are made in an environmentally friendly way. Half the respondents expressed their willingness to pay 10% more for bricks made in an environmentally way.

Builders expressed their lack of knowledge regarding the relationship between materials usage especially bricks and the interior environment of buildings. The response of builders regarding which type of brick provides highest insulation to heat and cold is not clear. In general though their perception is that hollow clay bricks may have the highest insulation properties among the different types of bricks and hollow concrete blocks the lowest. The responses regarding embedded energy of the different types of bricks proved inconclusive since their understanding about the concept of embedded energy of a building is unclear.

Anticipated Future Trends In The Use Of Bricks

Most of the builders anticipate that hollow cement blocks and machine made bricks will be used more in the future. This is a natural response assuming business as usual. But trends in the developed and some developing countries show that use of energy saving building material such as hollow bricks has increased over the past two decades.



CHAPTER 1

BACKGROUND AND OBJECTIVES

1.1 Background

In Bangladesh, fired clay solid bricks constitute a significant portion of the materials used in the construction industry. Trend data of the last decade show demand for bricks is rising steadily at about 5.28% annually. The main driver of this growth has been the construction industry, which has been growing above GDP rates.

Studies show that using hollow bricks, recycled waste and other new building materials instead of solid clay bricks can save as much as 47 percent of the energy in producing wall materials and 30 to 50 percent of the heating energy of dwellings. Hollow brick masonry is a natural development in brick masonry construction. Several reasons led to the production of hollow brick. These include the need for units that can be more easily reinforced and grouted, and more economically constructed than with solid bricks. More stringent structural requirements for buildings in high wind and seismic regions have required masonry units that can be grouted and reinforced. These requirements cannot be achieved as easily with solid masonry units.

With a view to encourage use of hollow bricks in Bangladesh, GTZ has taken up a project named **“Promoting Hollow Bricks Usage”**. This is a market transformation project aiming to eliminate/reduce demand side management barriers thereby promoting the use of hollow bricks by focusing on areas such as awareness building, managerial and technical capacity development and the promotion of green housing codes. It is also aimed at stimulating a step-change carbon reduction in the lifetime carbon footprint of the brick industry and its associated downstream industries. In addition, the use of hollow bricks will reduce production costs of bricks, ease resource use and cut downstream construction costs significantly.

Baseline Survey of Commercial Builders, Private Builders and Architects is a part of the “Promoting Hollow Bricks Usage” project. This survey aims at collecting data on the present usage and awareness parameters of different kinds of bricks used in construction of commercial and private buildings.

1.2 Objective of the Survey

The objective of this survey is to establish the baseline data on the present practice, availability, desirability, future trends, energy and environmental awareness regarding the use of solid bangla bricks, solid machine made bricks, hollow bricks and hollow concrete blocks.



CHAPTER 2 METHODOLOGY

2. Methodology

The key issues relevant to the methodology and overall implementation the proposed survey is presented below.

2.1 Survey Design

The major components of the survey design are as follows:

2.1.1 Sources of data

The prime objective of the study is to collect baseline data / information from commercial and private builders and architects on the use parameters of different types of brick. Prior to collecting detailed data / information all the relevant sources had been scanned for preparing type-wise list of respondents for each category under the survey. This has helped prepare the sampling frame of respondents for each category. The data regarding the respondents was collected from the Association of Architects Bangladesh and REHAB. But emphasis was laid on collecting primary data from at least 30 respondents.

2.1.2 Consultation with stakeholders and production of analysis plan

Before finalizing the survey design, consultations were held with some prospective respondents who are involved in the construction industry in Bangladesh. The main focus of the meetings was to identify the issues/areas/parameters, which will be addressed in the proposed survey. Furthermore, the survey team was acquainted with the specific requirements of the survey through these meetings.

Based on the discussions, the study team developed a theoretical framework for conducting the baseline survey and also developed an analysis plan for preparing the report.

2.1.3 Sample design

In the light of the broad objective of the study, the sample design is constructed in a manner so as to collect data on the baseline usage parameters of different type of bricks. A comprehensive approach combining collection of data through a sample survey and discussion with key personnel in the sector was arranged to have a better understanding of the grass root facts.

The sample size of enterprises has been kept at 36. 30 is the minimum sample size recommended if there is time and budget constraints

Stratified sampling technique was deployed to ensure the inclusion of different levels of respondents.

2.1.4 Instruments used for data collection

A combination of observation and interview techniques had been used to collect quantitative and qualitative information for the proposed survey.

A questionnaire was administered to collect baseline data of the selected respondents. The questionnaire was designed so as to document both structured/categorical, and open-ended responses. It also had provisions for tabbing attitudes and opinions of the respondents.

2.2 Survey Implementation Plan

Survey implementation was done in the following manner

2.2.1 Pre-survey fact-finding field trip

Before the actual survey was undertaken, the survey team made a rapid field trip to the construction sites in Dhaka city. This fact-finding trip made the team more familiar with the field reality in terms of the expectations stated in the TOR. It also helped them in preparing more effective instruments for data collection.

2.2.2 Development of draft data collection instruments

Before finalizing the draft questionnaire the survey team identified the indicators through a content analysis of the relevant reports, documents, and literature as well as pre-survey fact-finding field trip in view of the purpose of the survey.

Based on the TOR and theoretical framework was prepared after having conducted the content analysis of relevant documents/reports and team's fact-finding trip, draft data collection instruments was finalized in consultation with GTZ.

2.2.3 Field data collection

CEA sent 3 investigators for data collection from the specified locations distributed according to the number of respondents under the survey. In addition one person was selected as field supervisors for proper implementation of the data collection activities. The overall field activities were coordinated by him. The data was collected using a pre-designed questionnaire. The staffing pattern was designed in a manner so as to ensure proper administration of the questionnaires involving the least dislocation of normal activities of respondents.

Each investigator was provided with a set of guidelines for code of conduct and for data collection and overall administration of the survey. The investigators, after reaching the respondents, carried out the work with self-introduction and described the purpose of coming and objectives of the survey. They collected data as per guidelines and set questionnaire following the techniques, procedures and instructions of training. They recorded the data only after being fully satisfied that they have been able to make the respondents understand the questions and the respondents are offering probable answers according to their perception. They made all efforts to have a friendly and open-minded interaction with the respondents. All questions were asked one by one and data filled-in on the spot and the investigators put signature and preserved carefully for submission to the concerned field supervisor.

2.2.4 Training of investigators and field supervisor

The field supervisor and investigators were trained for one day at CEA office. The training was designed and imparted so as to make the trainees (investigators and field supervisor) conversant with the procedures of data collection. The techniques like discussion, mock interview, field demonstration, and review of field exercise were extensively used to make the training effective. The training particularly addressed the following areas:

- (i) Purpose and objectives of the study;
- (ii) Detailed methodology;
- (iii) Selection of enterprises;
- (iv) Procedure for administering the questionnaires;
- (v) Checking questionnaires and checklists;
- (vi) Record keeping; and
- (vii) Other related issues.

The survey coordinator gave the training.

2.2.5 Quality control of data collection

A quality control system was adopted for ensuring effective implementation of the field survey. Only trainees with satisfactory performance were selected for fieldwork. At least two filled-in questionnaires of each field investigator were re-administered by the field supervisor for maintaining quality control of data collection activities.

A further step for ensuring quality control was crosschecking filled-in questionnaires of the two field investigators. In the evening, field investigators checked each other's filled-in questionnaires to rectify errors, if any.

The survey coordinator supervised the entire data collection activities.

2.3. Data processing

Data Processing involved (i) checking, editing, and coding of the field-in questionnaires, and (ii) data entry and cleaning.

2.3.1 Checking, Editing and Coding

In the case of checking, editing and coding of the filled-in data particular attention was given to: (i) checking identification (ID) number of each questionnaire, (ii) checking inconsistency among the questions, (iii) coding the open-ended questions, and (iv) sample checking of the questionnaires by the survey coordinator. Field supervisor on completion of field activities did checking of the collected data.

The survey coordinator, before sending the questionnaires for computer entry, randomly select questionnaires and checked those.



2.3.2 Data Entry and Cleaning

Data entry was SPSS ver-12 for Windows. An appropriate data entry and cleaning program was developed to ensure storing of error-free data. For checking whether the figures are correctly entered, a manual checking involving the services of data entry operators and data checkers for a period of at least two days was necessary. All possible logical verifications were done in computer to free the data from all types of inconsistency and errors.

2.3.3 Analytical framework

In line with the objectives of the study, the analytical framework was designed to assess the responses by the different categories of respondents. In this regard, frequency tables, % distribution and cross tables by sub-categories were done. Prior to analyzing various baseline parameters, table plan was done and dummy tables were prepared to facilitate easy processing of the data.

2.4. Work Plan

The time to complete the baseline survey took about 4 weeks.

2.5.1 General

In the previous section the major activities of the survey were identified. This section provides the sequence and chronology of performing the identified activities for implementation of the survey to achieve the objectives and produce the intended output. Different activities need different duration and time frame, which have been shown in the bar chart. The activity list has the following phases of work.

- ❑ Planning
- ❑ Implementation
- ❑ Reporting

This section includes the following.

- ❑ Work Schedule and Task Matrix (Activity-time bar chart)
- ❑ Survey Implementation Team

2.5.2 Work Schedule and Task Matrix

The TOR provides the scope of works for implementation of the proposed survey. In the planning phase, the activities include mobilisation of staff, collection of project-related documents and secondary data on the usage of bricks of different types, review of the TOR, proposed methodology, implementation plan, and discussion with GTZ, pre-survey fact-finding field trip, finalising methodology, implementation plan (including operational strategy) and draft questionnaire based on the discussions, training of the data collection teams, finalising data collection instruments and printing.

The implementation phase followed the training of the field staff. The major activities of this phase will include collection of primary data through interviews and observations from the selected sample; checking and editing

collected data and coding of the open-ended questions of filled-in questionnaires by the field supervisor under the guidance of survey coordinator. Entering the collected data into computers by the data entry operators; cleaning the entered data by the survey coordinator; and data processing, preparation of statistical tables, and data analysis

The reporting phase involves preparation and submission of: (i) draft final report; and (ii) a final report.



CHAPTER 3 FINDINGS

3.1. Respondents

Respondents of the survey were randomly taken from among Architects, Commercial and Private Builders. A large number of respondents were approached but many of them were unable to provide sufficient time to give their responses to the survey questions, many more could not respond to the entire questionnaire. Only those who could respond to the majority of questions are included in the report. The distribution of the respondents is given in Table 1 below:

Table 1: Distribution Of Respondents

Type of Respondent							
Architect		Commercial Builder		Private Builder		Total	
Count	%	Count	%	Count	%	Count	%
12	33.3	12	33.3	12	33.3	36	100.0

3.2. Brick Market

Bricks are purchased almost throughout the year. Bangla bricks that are made only during dry season are purchased in large quantities in that season but during rainy season they are purchased in smaller quantities at higher price. Other types of bricks and concrete blocks are traded throughout the year but they too are comparatively costlier during rainy season.

3.2.1 Trading Pattern

The builders, if possible, purchase bricks from brickfields that are nearer to the construction site having acceptable quality and other requirements desired by them. They normally select a few brickfields from where they purchase bricks. Brickfields from where Architects most commonly advise their clients to purchase bricks are:

- Conforce Bricks, Nabi Nagar
- Mirpur Ceramic Bricks, Mirpur, Dhaka
- Sara Bricks, Konabari
- Unique Bricks, Konabari

Brickfields from where the Commercial Builders most commonly purchase bricks are:

- Mirpur Ceramic Bricks, Mirpur, Dhaka
- Runner Bricks, Mouchak
- Sara Bricks, Konabari
- N. B. M Bricks, Pagla

Brickfields from where the Private Builders most commonly purchase bricks are:

- A. B. C Bricks, Amin Bazar
- Asha Bricks, Gabtoli
- Modern Bricks, Ashulia



3.2.2 Reason for Purchasing Bricks from Selected Brickfields

Reasons for purchasing bricks from the selected brickfields are given in Table 2.1 below:

Table 2.1 : Reasons For Purchase Of Bricks From Selected Brickfields

Reasons for Purchasing From Selected Brickfields	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Right size	9	90.0	6	50.0	9	75.0	24	70.6
Good Strength	9	90.0	11	91.7	11	91.7	31	91.2
Good finish	10	100.0	7	58.3	3	25.0	20	58.8
Available year round	5	50.0	7	58.3	10	83.3	22	64.7
Low price			5	41.7	9	75.0	14	41.2
Timely delivery	7	70.0	8	66.7	9	75.0	24	70.6
Available on credit	1	10.0	10	83.3	7	58.3	18	52.9
Good price for quality	8	80.0	5	41.7	9	75.0	22	64.7
Good color	9	90.0	6	50.0	6	50.0	21	61.8
Good shape	10	100.0	7	58.3			17	50.0
Total	10	100.0	12	100.0	12	100.0	34	100.0

Note: Because of multiple responses the percentages add up to more than 100.

Conclusion : Most common reasons for purchasing bricks from selected brickfields are good strength, followed by right size and timely delivery.

3.2.3 Satisfied with the specification of bricks supplied

Builders purchase bricks from a few selected brickfields. Whether they get the bricks according to their required specification is shown below in Table 2.2

Table 2.2: Get Supply As Per Specification

Type of Respondent	Get bricks as per required specifications					
	Yes		No		Total	
	Count	%	Count	%	Count	%
Architect	8	66.7	4	33.3	12	100.0
Commercial Builder	7	58.3	5	41.7	12	100.0
Private Builder	12	100.0	0	.0	12	100.0
Total	27	75.0	9	25.0	36	100.0

Conclusion: A quarter of the builders are not satisfied with the specifications of the brick supplied to them by the selected brickfields

3.2.4 Satisfied with the delivery time

Whether the selected brickfields supply bricks in time as required by the builders is shown below in Table 2.3

Table 2.3: Get Bricks In Time

Type of Respondent	Get bricks in time			
	Yes		No	
	Count	%	Count	%
Architect	9	75.0	3	25.0
Commercial Builder	10	83.3	2	16.7
Private Builder	11	91.7	1	8.3
Total	30	83.3	6	16.7

Conclusion: A large majority of the builders get bricks in time from their selected brickfields

3.2.5 Pay in Advance

Construction is mostly done in dry season. Builders have to pay in advance for the bricks they purchase to make sure that they have enough bricks for construction to be uninterrupted. How many of the builders pay in advance is shown below in Table 2.4

Table 2.4: Pay In Advance

Type of Respondent	Pay in advance			
	Yes		No	
	Count	%	Count	%
Architect	7	77.8	2	22.2
Commercial Builder	3	27.3	8	72.7
Private Builder	8	66.7	4	33.3
Total	18	56.3	14	43.8

Conclusion: More than half of the builders pay in advance, for the bricks purchased, to the selected brickfields

3.3. Availability

Bricks are available throughout the year, but are available in larger quantities during the dry production season. The response regarding availability is given below

3.3.1. Availability of Bangla Bricks

Bangla bricks are made in dry season and the response about their availability is given below in Table 3.1

Table 3.1: Availability Of Bangla Bricks

Type of Respondent	Bangla bricks sufficiently available				Use More if sufficiently available			
	Yes		No		Yes		No	
	Count	%	Count	%	Count	%	Count	%
Architect	10	83.3	2	16.7	2	100.0	0	.0
Commercial Builder	8	72.7	3	27.3	2	66.7	1	33.3
Private Builder	12	100.0	0	.0	0	.0	0	.0
Total	30	85.7	5	14.3	4	80.0	1	20.0

Conclusion: Bangla bricks are sufficiently available

3.3.2 Availability of Pickets

Pickets, which are over burnt bricks, are mostly product of FCKs, their availability is given below in Table 3.2

Table 3.2: Availability Of Pickets

Type of Respondent	Pickets sufficiently available				Use More if Sufficiently Available			
	Yes		No		Yes		No	
	Count	%	Count	%	Count	%	Count	%
Architect	10	90.9	1	9.1	1	100.0	0	.0
Commercial Builder	6	85.7	1	14.3	0	.0	0	.0
Private Builder	12	100.0	0	.0	0	.0	0	.0
Total	28	93.3	2	6.7	1	100.0	0	.0

Conclusion: Pickets are sufficiently available

3.3.3 Availability of Machine made bricks

Machine made bricks are mostly gas-fired bricks. Green bricks are extruded by using moulds/dies. They are made throughout the year. Their availability is given below in Table 3.3

Table 3.3: Availability Of Machine Made Bricks

Type of Respondent	Machine made bricks sufficiently available				Use More if Sufficiently Available			
	Yes		No		Yes		No	
	Count	%	Count	%	Count	%	Count	%
Architect	6	54.5	5	45.5	5	100.0	0	.0
Commercial Builder	5	45.5	6	54.5	3	75.0	1	25.0
Private Builder	1	8.3	11	91.7	2	18.2	9	81.8
Total	12	35.3	22	64.7	10	50.0	10	50.0

Conclusion: Machine made bricks are not sufficiently available as the demand for them is higher than their supply. Even if they are sufficiently available half of the builders would not use them for factors other than availability

3.3.4 Availability of Hollow Clay Bricks

Hollow clay bricks are mostly gas fired. Green bricks are extruded using molds/dies. They are made throughout the year. Their availability is given below in Table 3.4

Table 3.4: Availability Of Hollow Clay Bricks

Type of Respondent	Hollow clay bricks sufficiently available				Use More if Sufficiently Available			
	Yes		No		Yes		No	
	Count	%	Count	%	Count	%	Count	%
Architect	5	62.5	3	37.5	0	.0	0	.0
Commercial Builder	3	37.5	5	62.5	2	66.7	1	33.3
Private Builder	0	.0	11	100.0	2	18.2	9	81.8
Total	8	29.6	19	70.4	4	28.6	10	71.4

Conclusion: Like machine made bricks, hollow clay bricks are not sufficiently available as the demand for them is higher than their supply. Even if they are sufficiently available 71% of the builders

would not use them for factors other than availability

3.3.5 Availability of Hollow Concrete Blocks

Hollow concrete blocks are made throughout the year. Their availability is given below in Table 3.5

Table 3.5: Availability Of Hollow Concrete Blocks

Type of Respondent	Hollow concrete blocks sufficiently available				Use More if Sufficiently Available			
	Yes		No		Yes		No	
	Count	%	Count	%	Count	%	Count	%
Architect	3	50.0	3	50.0	0	.0	0	.0
Commercial Builder	3	50.0	3	50.0	0	.0	2	100.0
Private Builder	0	.0	12	100.0	0	.0	11	100.0
Total	6	25.0	18	75.0	0	.0	13	100.0

- *Hollow concrete blocks are not sufficiently available. Even if they are sufficiently available all the builders would not use them due to factors other than availability*

3.3.6 Unwillingness to use more even if sufficiently available

Non-availability of sufficient amount of bricks is not the only factor that prevents builders from using more of a particular type of brick. Table 3.6 below shows that there are other reasons as well that prevent builders from using particular types of bricks

Table 3.6: Reasons For Not Using More Even If Sufficient Bricks Are Available

Reason for not using more even if sufficiently available		Type of Respondent					
		Architect		Commercial Builder		Private Builder	
		Count	%	Count	%	Count	%
Bangla bricks	Not good quality available	0	.0	1	100.0	0	.0
Machine made bricks	Skilled masons not available	0	.0	0	.0	2	100.0
Hollow clay bricks	Skilled masons not available	0	.0	0	.0	2	50.0
	Leaks from utility lines	0	.0	0	.0	2	50.0
	High price	0	.0	1	100.0	0	.0
Hollow concrete blocks	Low strength	0	.0	0	.0	3	75.0
	No knowledge how to use	0	.0	0	.0	1	25.0
	Not proper size	0	.0	1	50.0	0	.0
	High wastage	0	.0	1	50.0	0	.0

Conclusion: Factors like low strength, leakage from utility lines, non-availability of skilled masons etc prevent builders from using more of machine made bricks, hollow clay bricks and hollow concrete blocks even if they are sufficiently available

3.4. Present Practices

Present building practices were surveyed and major trends were found as follows:

3.4.1 Types of bricks used for different components of building construction

Bricks are used in different parts of buildings. The present uses are shown below

3.4.1.1 Use of Bangla Bricks

Use of Bangla bricks is shown below in table 4.1.1

Table 4.1.1: Use Of Bangla Bricks

For what purpose bangla bricks are used	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Load bearing walls	8	72.7	3	27.3	9	75.0	20	58.8
Outside walls	11	100.0	9	81.8	12	100.0	32	94.1
Inside walls	11	100.0	9	81.8	11	91.7	31	91.2
Foundation	9	81.8	3	27.3	11	91.7	23	67.6
Boundary walls	10	90.9	10	90.9	11	91.7	31	91.2
Garage/outside store walls	8	72.7	10	90.9	11	91.7	29	85.3
Soling	11	100.0	11	100.0	11	91.7	33	97.1
Total	11	100.0	11	100.0	12	100.0	34	100.0

Note: Because of multiple responses the percentages add up to more than 100.

Conclusion: Those who use bangla bricks use it mostly for soling followed by outside walls, inside walls and boundary walls

3.4.1.2 Use of Machine made Bricks

Use of machine made bricks is shown below in table 4.1.2

Table 4.1.2: Use Of Machine Made Bricks

For what purpose machine made bricks are used	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Load bearing walls	4	36.4	3	27.3	1	33.3	8	32.0
Outside walls	11	100.0	9	81.8	2	66.7	22	88.0
Inside walls	5	45.5	10	90.9	2	66.7	17	68.0
Foundation	1	9.1	2	18.2	3	100.0	6	24.0
Boundary walls	7	63.6	3	27.3	1	33.3	11	44.0
Garage/outside store walls	5	45.5	4	36.4			9	36.0
Soling	1	9.1	2	18.2	1	33.3	4	16.0
Total	11	100.0	11	100.0	3	100.0	25	100.0

Note: Because of multiple responses the percentages add up to more than 100.

Conclusion: Those who use machine made bricks use it mostly for outside walls followed by inside walls

3.4.1.3 Use of Hollow Clay Bricks

Use of Hollow clay bricks is shown below in table 4.1.3

Table 4.1.3: Use Of Hollow Clay Bricks

For what purpose hollow clay bricks are used	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Load bearing walls			1	14.3			1	5.9
Outside walls	3	50.0	4	57.1	2	50.0	9	52.9
Inside walls	6	100.0	7	100.0	2	50.0	15	88.2
Boundary walls	2	33.3	1	14.3	2	50.0	5	29.4
Garage/outside store walls	1	16.7					1	5.9
Total	6	100.0	7	100.0	4	100.0	17	100.0

Note: Because of multiple responses the percentages add up to more than 100.

Conclusion: Those who use hollow clay bricks use it mostly for inside walls

3.4.1.4 Use of Hollow Concrete Blocks

Use of Hollow clay bricks is shown below in table 4.1.4

Table 4.1.4: Use Of Hollow Concrete Blocks

For what purpose hollow concrete blocks are used	Type of Respondent				Total	
	Architect		Commercial Builder		Count	%
	Count	%	Count	%		
Load bearing walls			1	33.3	1	20.0
Outside walls	1	50.0	2	66.7	3	60.0
Inside walls	1	50.0	2	66.7	3	60.0
Foundation			1	33.3	1	20.0
Boundary walls			2	66.7	2	40.0
Garage/outside store walls			1	33.3	1	20.0
Total	2	100.0	3	100.0	5	100.0

Note: Because of multiple responses the percentages add up to more than 100.

Conclusion: Those who use hollow concrete blocks use it mostly for outside and inside walls

3.4.1.5 Comparative Use of Different Type of Bricks

For making different parts of buildings, the comparative use of different types of bricks is shown below in Table 4.1.5

Table 4.1.5: Comparative Use of Different Type of Bricks

For what purpose bricks are used	Bangla bricks		Machine made bricks		Hollow clay bricks		Hollow concrete blocks		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
Load bearing walls	20	66.7	8	26.7	1	3.3	1	3.3	30	100.0
Outside walls	32	48.5	22	33.3	9	13.6	3	4.5	66	100.0
Inside walls	31	47.0	17	25.8	15	22.7	3	4.5	66	100.0
Foundation	23	76.7	6	20.0		0.0	1	3.3	30	100.0
Boundary walls	31	63.3	11	22.4	5	10.2	2	4.1	49	100.0
Garage/outside store walls	29	72.5	9	22.5	1	2.5	1	2.5	40	100.0
Soling	33	89.2	4	10.8		0.0		0.0	37	100.0
Total Responded	34	42.0	25	30.9	17	21.0	5	6.2	81	100.0

Note: Because of multiple responses the percentages add up to more than 100.

Conclusion: For all parts of buildings, majority of builders use bangla bricks followed by machine made bricks, hollow clay bricks and hollow concrete blocks

3.4.1.6 Overall use of different types of bricks

The percentage of the different types of bricks used by the builders in Bangladesh are shown below in Table 4.1.6

Table 4.1.6: Overall Use Of Different Types Of Bricks

Type of Respondent	Percentage of bangla bricks	Percentage of pickets	Percentage of machine made bricks	Percentage of hollow clay bricks	Percentage of hollow concrete blocks
	Mean	Mean	Mean	Mean	Mean
Architect	53	8	38	2	1
Commercial Builder	47	1	36	8	8
Private Builder	68	23	8	2	0
Average	56	11	27	4	3

Conclusion: Bangla bricks are mostly used by builders followed by machine made bricks. Hollow concrete blocks are least used by them

3.4.2 Reasons for Using Particular Type of Bricks

Builders have the choice of using a range of bricks for different parts of a building such as outside walls, inside walls, foundation etc. But they prefer to use a particular type for a particular part because of the factors mentioned below

3.4.2.1 Major Reasons for Using Bangla Bricks

Builders gave the following reasons for using bangla bricks as shown below in Table 4.2.1



Table 4.2.1: Major Reasons For Using Bangla Bricks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Readily available	4	33.3	7	63.6	3	25.0	14	40.0
Low price	6	50.0	7	63.6	12	100.0	25	71.4
Good strength	1	8.3	2	18.2	2	16.7	5	14.3
Good shape					1	8.3	1	2.9
Good color	1	8.3					1	2.9
Low labor			2	18.2			2	5.7
Skilled labor available			1	9.1	3	25.0	4	11.4
Good finish					2	16.7	2	5.7
Available on credit			1	9.1	7	58.3	8	22.9
Low transport cost					5	41.7	5	14.3
Salt free			1	9.1			1	2.9
Aesthetic beauty	5	41.7					5	14.3
Total	12	100.0	11	100.0	12	100.0	35	100.0

Conclusion: Major reasons for using bangla bricks is firstly low price followed by ready availability and availability on credit

3.4.2.2 Major Reasons for Using Machine made Bricks

Builders gave the following reasons for using machine made bricks as shown below in Table 4.2.2

Table 4.2.2: Major Reasons For Using Machine Made Bricks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Readily available	1	9.1					1	3.4
Good strength	1	9.1	2	20.0	3	37.5	6	20.7
Good shape	1	9.1	5	50.0	3	37.5	9	31.0
Good color	1	9.1			1	12.5	2	6.9
Low labor					2	25.0	2	6.9
Do not use					5	62.5	5	17.2
Good finish	5	45.5	4	40.0			9	31.0
Good size	1	9.1	5	50.0			6	20.7
Salt free			2	20.0			2	6.9
Low finishing cost			1	10.0			1	3.4
Aesthetic beauty	4	36.4	5	50.0			9	31.0
Low wastage			1	10.0			1	3.4
Good insulation	1	9.1					1	3.4
Total	11	100.0	10	100.0	8	100.0	29	100.0

Conclusion: Major reasons for using machine made bricks are its good shape, good finish and aesthetic beauty

3.4.2.3 Major Reasons for Using Hollow Clay Bricks

Builders gave the following reasons for using hollow clay bricks as shown below in Table 4.2.3

Table 4.2.3: Major Reasons For Using Hollow Clay Bricks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Good strength			1	14.3	3	30.0	4	16.7
Good shape			1	14.3	2	20.0	3	12.5
Do not use					5	50.0	5	20.8
No response					2	20.0	2	8.3
Good size					3	30.0	3	12.5
Salt free			2	28.6			2	8.3
Low finishing cost			2	28.6			2	8.3
Light weight	5	71.4	5	71.4			10	41.7
Aesthetic beauty			1	14.3			1	4.2
Low wastage			1	14.3			1	4.2
Good insulation	3	42.9	1	14.3			4	16.7
Better bonding	2	28.6					2	8.3
Total	7	100.0	7	100.0	10	100.0	24	100.0

Conclusion: Major reasons for using hollow clay bricks are its light weight, good insulation and good strength

3.4.2.4 Major Reasons for Using Hollow Concrete Blocks

There is one large builder (Concord) who makes own hollow concrete blocks and uses them in all of its buildings. Other builders use hollow concrete blocks sparingly and the reason given by them for using hollow concrete blocks is shown below in Table 4.2.4

Table 4.2.4: Major Reasons For Using Hollow Concrete Blocks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Low labor	1	100.0					1	10.0
Do not use					5	71.4	5	50.0
No response					2	28.6	2	20.0
Salt free			1	50.0			1	10.0
Low finishing cost	1	100.0	1	50.0			2	20.0
Light weight			1	50.0			1	10.0
Faster Construction	1	100.0					1	10.0
Total	1	100.0	2	100.0	7	100.0	10	100.0

Conclusion: Major reasons for using hollow concrete blocks are low finishing cost, low labor, faster construction, salt free and light weight

3.4.3 Major Reasons For Not Using More Of A Particular Type Of Brick

As mentioned above, although bricks can be used in any part of a building, builders prefer not to use bricks made in different kilns and in different configurations in certain part of a building. The survey indicates the general reasons for this below

3.4.3.1 Major Reasons for Not Using More of Bangla Bricks

Builders gave the following reasons for not using bangla bricks as shown below in Table 4.3.1

Table 4.3.1: Major Reasons For Not Using More Of Bangla Bricks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Not good strength	1	12.5	2	22.2	1	11.1	4	15.4
Not good shape	3	37.5	6	66.7	5	55.6	14	53.8
Not available on credit					1	11.1	1	3.8
Do not know					1	11.1	1	3.8
Not good size	6	75.0	5	55.6	3	33.3	14	53.8
High labor cost					2	22.2	2	7.7
Not good color					3	33.3	3	11.5
High salt	1	12.5	3	33.3			4	15.4
Not good looking			1	11.1			1	3.8
Not good for pointing			2	22.2			2	7.7
Total	8	100.0	9	100.0	9	100.0	26	100.0

Conclusion: Major reasons for not using more of bangla bricks is that it does not have good shape and size

3.4.3.2 Major Reasons For Not Using More Of Machine Made Bricks

Builders gave the following reasons for not using more of machine made bricks as shown below in Table 4.3.2

Table 4.3.2: Major Reasons For Not Using More Of Machine Made Bricks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Not readily available	1	14.3	7	87.5	3	60.0	11	55.0
Not available on credit			2	25.0	3	60.0	5	25.0
Do not know					2	40.0	2	10.0
High price	5	71.4	6	75.0			11	55.0
Not good for plastering			1	12.5			1	5.0
No Variety	2	28.6					2	10.0
Total	7	100.0	8	100.0	5	100.0	20	100.0

Conclusion: Major reasons for not using more of machine made bricks are that they are not readily available and have high price



3.4.3.3 Major Reasons for Not Using More of Hollow Clay Bricks

Builders gave the following reasons for not using more of hollow clay bricks as shown below in Table 4.3.3

Table 4.3.3: Major Reasons For Not Using More Of Hollow Clay Bricks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Not good strength			1	12.5			1	4.3
Not readily available	2	28.6	4	50.0	5	62.5	11	47.8
Do not know					2	25.0	2	8.7
Do not use					1	12.5	1	4.3
High price	3	42.9	4	50.0	5	62.5	12	52.2
Skilled labor not available					4	50.0	4	17.4
Not good looking			1	12.5			1	4.3
Breaks in utility lines	2	28.6	1	12.5			3	13.0
Dampness inside	2	28.6	1	12.5			3	13.0
Not good bonding			1	12.5			1	4.3
Uneven breaking	1	14.3					1	4.3
Total	7	100.0	8	100.0	8	100.0	23	100.0

Conclusion: Major reasons for not using more of hollow clay bricks are high price and inadequate supply

3.4.3.4 Major Reasons for Not Using More of Hollow Concrete Blocks

The reason given by them for using hollow concrete blocks is shown below in Table 4.3.4

Table 4.3.4: Major Reasons For Not Using More Of Hollow Concrete Blocks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Not good strength					2	40.0	2	20.0
Not readily available	1	25.0	1	100.0			2	20.0
Do not know					2	40.0	2	20.0
Do not use					1	20.0	1	10.0
High price	1	25.0	1	100.0			2	20.0
Skilled labor not available					1	20.0	1	10.0
Breaks in utility lines	1	25.0					1	10.0
Dampness inside	1	25.0					1	10.0
Uneven breaking	1	25.0					1	10.0
Total	4	100.0	1	100.0	5	100.0	10	100.0

Conclusion: Major reasons for not using more of hollow concrete blocks are low strength, inadequate supply and high price

3.5. Comparison among different types of bricks

Comparisons among different type of bricks are shown below. These comparisons are based on the responses received from builders. The responses range from 1 to 4. 1 is lowest and 4 is highest. The responses in many

cases are dissimilar resulting in high standard deviation. For response based on knowledge derived from accepted research or studies the standard deviation will be close to zero. But it can be seen that it is quite high showing that the builders are dependent on their opinion and individual experience rather than on studies and research.

3.5.1 Labor Cost

Labor cost for similar construction as responded by the builders is show below in Table 5.1

Table 5.1: Labor Cost

Labor Cost		Type of Respondent			
		Architect	Commercial Builder	Private Builder	Total
Bangla bricks	Mean	2.6	3.8	3.9	3.4
	Standard Deviation				1.0
Machine made bricks	Mean	3.2	3.0	3.3	3.1
	Standard Deviation				.7
Hollow clay bricks	Mean	2.3	2.5	2.0	2.4
	Standard Deviation				.8
Hollow concrete blocks	Mean	1.7	2.0	.	1.9
	Standard Deviation				1.1

Conclusion: Labor cost for construction with bangla bricks is perceived as being highest and with hollow concrete bricks as lowest

3.5.2 Cost of Cement

The cost of cement for similar construction is given below in Table 5.2

Table 5.2: Cost Of Cement

Cost of Cement		Type of Respondent			
		Architect	Commercial Builder	Private Builder	Total
Bangla bricks	Mean	3.6	4.0	3.9	3.8
	Standard Deviation	1.1	.0	.4	.6
Machine made bricks	Mean	2.0	2.8	3.3	2.6
	Standard Deviation	.8	.7	.6	.8
Hollow clay bricks	Mean	2.3	2.2	2.0	2.2
	Standard Deviation	.7	.8	.	.7
Hollow concrete blocks	Mean	1.0	1.3	.	1.1
	Standard Deviation	.0	.5	.	.4

Conclusion: Cost of cement for construction with bangla bricks is perceived as highest and with hollow concrete bricks as lowest

3.5.3.1 Wastage during construction

Wastage during construction for similar type of work is given below in Table 5.3.1

Table 5.3.1: Wastage During Construction

Wastage during construction		Type of Respondent			
		Architect	Commercial Builder	Private Builder	Total
Bangla bricks	Mean	3.6	3.0	3.9	3.4
	Standard Deviation	.9	1.1	.4	.9
Machine made bricks	Mean	2.0	2.6	3.3	2.5
	Standard Deviation	1.1	1.1	.6	1.1
Hollow clay bricks	Mean	2.6	2.6	.	2.6
	Standard Deviation	.5	.7	.	.6
Hollow concrete blocks	Mean	2.3	3.2	.	2.9
	Standard Deviation	1.5	1.3	.	1.4

Conclusion: Wastage during construction with bangla bricks is perceived as highest, followed by hollow clay bricks and machine made bricks. Wastage with hollow concrete blocks is lowest

3.5.3.2 Percentage of Wastage during construction

Percentage of wastage during construction for similar type of work is given below in Table 5.3.2

Table 5.3.2: Percentage Of Wastage During Construction

Wastage	Type of Respondent			
	Architect	Commercial Builder	Private Builder	Total
	Mean (%)	Mean (%)	Mean (%)	Mean (%)
Bangla bricks	13	10	7	10
Machine made bricks	9	5	4	6
Hollow clay bricks	5	6	.	6
Hollow cement blocks	5	6	.	6

Conclusion: Wastage during construction with bangla bricks is highest followed by hollow clay bricks, machine made bricks and hollow concrete blocks all three of them nearly same

3.5.4 Time required

The time consumed in building similar type of wall using different type of bricks is given below in Table 5.4

Table 5.4: Construction Time Required

Construction time required		Type of Respondent			
		Architect	Commercial Builder	Private Builder	Total
Bangla bricks	Mean	3.0	3.5	3.9	3.4
	Standard Deviation	1.2	1.0	.4	1.0
Machine made bricks	Mean	3.0	2.7	3.3	2.9
	Standard Deviation	1.1	1.0	.6	1.0
Hollow clay bricks	Mean	2.8	2.1	2.0	2.4
	Standard Deviation	.8	.9	.	.9
Hollow concrete blocks	Mean	2.8	2.0	.	2.3
	Standard Deviation	1.5	1.3	.	1.3

Conclusion: Construction time required with bangla bricks is perceived as highest, followed by machine made bricks then hollow clay bricks. Hollow concrete blocks require the least

3.5.5 Cost of Finishing

Cost of finishing required for similar type of work is given below in Table 5.5

Table 5.5: Cost of Finishing

Cost of finishing		Type of Respondent			
		Architect	Commercial Builder	Private Builder	Total
Bangla bricks	Mean	3.9	3.6	3.9	3.8
	Standard Deviation	.4	.9	.4	.6
Machine made bricks	Mean	2.7	2.7	3.3	2.8
	Standard Deviation	1.0	.9	.6	.9
Hollow clay bricks	Mean	2.3	2.2	2.0	2.2
	Standard Deviation	.6	1.0	.	.8
Hollow concrete blocks	Mean	2.0	1.8	.	1.9
	Standard Deviation	1.4	1.1	.	1.1

Conclusion: Cost of finishing with bangla bricks is perceived as highest, followed by machine made bricks then hollow clay bricks. It is least with hollow concrete blocks

3.5.6 Cost of Laying Utilities

Cost of laying utilities for similar type of work is given below in Table 5.6

Table 5.6: Cost of Laying Utilities

Cost of laying utilities		Type of Respondent			
		Architect	Commercial Builder	Private Builder	Total
Bangla bricks	Mean	2.9	3.1	3.9	3.2
	Standard Deviation	1.3	.9	.4	1.0
Machine made bricks	Mean	2.9	2.9	3.3	3.0
	Standard Deviation	1.0	1.2	.6	1.0
Hollow clay bricks	Mean	3.3	2.5	2.0	2.8
	Standard Deviation	1.0	1.1	.	1.0
Hollow concrete blocks	Mean	2.8	2.7	.	2.7
	Standard Deviation	1.5	1.5	.	1.4

Conclusion: Cost of laying utilities with bangla bricks is perceived as highest, followed by machine made Bricks then hollow clay bricks. It is least with hollow concrete blocks

3.5.7 Aesthetic Beauty

Aesthetic beauty for similar type of work using different types of bricks is given below in Table 5.7

Table 5.7 Aesthetic Beauty

Aesthetic beauty		Type of Respondent			
		Architect	Commercial Builder	Private Builder	Total
Bangla bricks	Mean	3.9	2.4	3.8	3.3
	Standard Deviation	.3	1.1	.5	1.0
Machine made bricks	Mean	3.0	3.7	3.7	3.5
	Standard Deviation	.8	.5	.6	.7
Hollow clay bricks	Mean	2.3	2.6	2.0	2.5
	Standard Deviation	.5	.9	.	.7
Hollow concrete blocks	Mean	1.0	1.8	.	1.7
	Standard Deviation	.	.8	.	.8

Conclusion: Aesthetic beauty with machine made bricks is perceived as highest, followed by bangla bricks and hollow clay bricks. It is least with hollow concrete blocks

3.5.8 Lifetime Maintenance

Lifetime maintenance required for similar type of construction using different types of bricks is given below in Table 5.8

Table 5.8 Lifetime Maintenance

Maintenance Required During Lifetime		Type of Respondent							
		Architect		Commercial Builder		Private Builder		Total	
		Count	%	Count	%	Count	%	Count	%
Highest	Bangla bricks	8	88.9	10	83.3	11	91.7	29	87.9
	Machine made bricks	0	.0	0	.0	1	8.3	1	3.0
	Hollow clay bricks	0	.0	1	8.3	0	.0	1	3.0
	Hollow cement blocks	0	.0	1	8.3	0	.0	1	3.0
	do not know	1	11.1	0	.0	0	.0	1	3.0
	Total	9	100.0	12	100.0	12	100.0	33	100.0
Second highest	Bangla bricks	1	11.1	1	10.0	1	12.5	3	11.1
	Machine made bricks	5	55.6	7	70.0	2	25.0	14	51.9
	Hollow clay bricks	2	22.2	1	10.0	0	.0	3	11.1
	Hollow cement blocks	0	.0	0	.0	0	.0	0	.0
	do not know	1	11.1	1	10.0	5	62.5	7	25.9
	Total	9	100.0	10	100.0	8	100.0	27	100.0
Second lowest	Bangla bricks	0	.0	0	.0	0	.0	0	.0
	Machine made bricks	1	12.5	2	20.0	0	.0	3	11.5
	Hollow clay bricks	3	37.5	7	70.0	0	.0	10	38.5
	Hollow cement blocks	1	12.5	0	.0	0	.0	1	3.8
	do not know	3	37.5	1	10.0	8	100.0	12	46.2
	Total	8	100.0	10	100.0	8	100.0	26	100.0
Lowest	Bangla bricks	0	.0	1	16.7	0	.0	1	4.8
	Machine made bricks	1	14.3	0	.0	0	.0	1	4.8
	Hollow clay bricks	1	14.3	1	16.7	0	.0	2	9.5
	Hollow cement blocks	3	42.9	1	16.7	0	.0	4	19.0
	do not know	2	28.6	3	50.0	8	100.0	13	61.9
	Total	7	100.0	6	100.0	8	100.0	21	100.0

Conclusion: Lifetime maintenance with bangla bricks is perceived as highest, followed by machine made bricks then hollow clay bricks. It is least with hollow concrete blocks

3.6. Limitations

The major limitation in the use of different types of bricks are given below

3.6.1. Knowledge and Skills in Laying of Bricks

The speed and manner of laying bricks is dependent on the skill level and familiarity of construction workers with different types of bricks. The responses from builders are given below.

3.6.1.1 Knowledge and Skills in Laying Bangla Bricks

Builders' responses regarding proper knowledge and skill in laying of bangla bricks is given below in Table 6.1.1

Table 6.1.1: Knowledge And Skills In Laying Bangla Bricks

Type of Respondent	Proper knowledge and skills available for laying bangla bricks			
	Yes		No	
	Count	%	Count	%
Architect	10	83.3	2	16.7
Commercial Builder	10	83.3	2	16.7
Private Builder	12	100.0	0	.0
Total	32	88.9	4	11.1

Conclusion: About 90% of the builders think that proper knowledge and skills for laying of bangla bricks is available

3.6.1.2 Knowledge and Skills in Laying Machine made Bricks

Builders' responses regarding proper knowledge and skill in laying of machine made bricks is given below in Table 6.1.2

Table 6.1.2: Knowledge And Skills In Laying Machine Made Bricks

Type of Respondent	Proper knowledge and skills available for laying machine made bricks			
	Yes		No	
	Count	%	Count	%
Architect	10	83.3	2	16.7
Commercial Builder	8	66.7	4	33.3
Private Builder	3	25.0	9	75.0
Total	21	58.3	15	41.7

Conclusion: Slightly more than half of the builders think that proper knowledge and skills for laying of machine made bricks is available

3.6.1.3 Knowledge and Skills in Laying Hollow Clay Bricks

Builders' responses regarding proper knowledge and skill in laying of hollow clay bricks is given below in Table 6.1.3

Table 6.1.3: Knowledge And Skills In Laying Hollow Clay Bricks

Type of Respondent	Proper knowledge and skills available for laying hollow clay bricks					
	Yes		No		No response	
	Count	%	Count	%	Count	%
Architect	6	50.0	5	41.7	1	8.3
Commercial Builder	5	41.7	6	50.0	1	8.3
Private Builder	0	.0	12	100.0	0	.0
Total	11	30.6	23	63.9	2	5.6

Conclusion: About two thirds of the builders think that proper knowledge and skills for laying of hollow clay bricks is not available

3.6.1.4 Knowledge and Skills in Laying Hollow Concrete Blocks

Builders' responses regarding proper knowledge and skill in laying of hollow concrete blocks is given below in Table 6.1.4

Table 6.1.4: Knowledge And Skills In Laying Hollow Concrete Blocks

Type of Respondent	Proper knowledge and skills available for laying hollow concrete blocks					
	Yes		No		No response	
	Count	%	Count	%	Count	%
Architect	3	25.0	5	41.7	4	33.3
Commercial Builder	2	16.7	5	41.7	5	41.7
Private Builder	0	.0	12	100.0	0	.0
Total	5	13.9	22	61.1	9	25.0

Conclusion: About two thirds of the builders think that proper knowledge and skills for laying of hollow concrete blocks is not available

3.7. Desirable Features

The builders are not satisfied with the different types of bricks available to them. They desire additional features in the bricks. The desirable features of different types of bricks as mentioned by the builders are given below.

3.7.1 Desirable Features in Bangla Bricks

The features desired for bangla bricks by the builders are given below in Table 7.1



Table 7.1 Desirable Features In Bangla Bricks

Desired Features	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Good shape	5	41.7	9	75.0	8	66.7	22	61.1
Well burnt	2	16.7	4	33.3	10	83.3	16	44.4
Good strength	5	41.7	4	33.3	11	91.7	20	55.6
Available all year			2	16.7			2	5.6
Good size	10	83.3	7	58.3	6	50.0	23	63.9
Salt free	1	8.3	4	33.3	1	8.3	6	16.7
Variety	1	8.3	1	8.3			2	5.6
Less porous	1	8.3					1	2.8
Total	12	100.0	12	100.0	12	100.0	36	100.0

Note: Because of multiple responses the percentages add up to more than 100.

Conclusion: Most desirable features in bangla bricks are good size, good shape and good strength

3.7.2 Desirable Features in Machine made Bricks

The features desired for machine made bricks by the builders are given below in Table 7.2

Table 7.2 Desirable Features In Machine Made Bricks

Desired Features	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Good shape					2	33.3	2	7.7
Well burnt	1	10.0	2	20.0	3	50.0	6	23.1
Good strength	1	10.0			3	50.0	4	15.4
Low price	3	30.0	4	40.0	3	50.0	10	38.5
Available all year	1	10.0	2	20.0	1	16.7	4	15.4
Good size	2	20.0					2	7.7
Available on credit					2	33.3	2	7.7
Frog mark			3	30.0			3	11.5
Three holes			1	10.0			1	3.8
Variety	5	50.0					5	19.2
Good color	2	20.0	3	30.0			5	19.2
Total	10	100.0	10	100.0	6	100.0	26	100.0

Note: Because of multiple responses the percentages add up to more than 100

Conclusion: Most desirable features in machine made bricks are low price, well burnt, variety and good color

3.7.3 Desirable Features in Hollow Clay Bricks

The features desired for hollow clay bricks by the builders are given below in Table 7.3

Table 7.3 Desirable Features In Hollow Clay Bricks

Desired Features	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Good shape					3	33.3	3	13.6
Well burnt					2	22.2	2	9.1
Good strength			2	22.2	4	44.4	6	27.3
Low price	1	25.0	7	77.8	4	44.4	12	54.5
Available all year			2	22.2	5	55.6	7	31.8
do not know					6	66.7	6	27.3
Available on credit					1	11.1	1	4.5
Variety	2	50.0	2	22.2			4	18.2
Good color			1	11.1			1	4.5
Less wastage			1	11.1			1	4.5
Less brittle			1	11.1			1	4.5
Less porous	1	25.0					1	4.5
Good finish	1	25.0					1	4.5
Total	4	100.0	9	100.0	9	100.0	22	100.0

Note: Because of multiple responses the percentages add up to more than 100

Conclusion: Most desirable features in hollow clay bricks are low price, year round availability, good strength and variety

3.7.4 Desirable Features in Hollow Concrete Blocks

The features desired for hollow concrete blocks by the builders are given below in Table 7.4. the Architects did not give any response

Table 7.4 Desirable Features In Hollow Concrete Blocks

Desired Features	Type of Respondent				Total	
	Commercial Builder		Private Builder		Count	%
	Count	%	Count	%		
Good shape			1	20.0	1	14.3
Low price			4	80.0	4	57.1
Available all year			1	20.0	1	14.3
Good size	1	50.0			1	14.3
Do not know			3	60.0	3	42.9
Less porous	1	50.0			1	14.3
Light weight	1	50.0			1	14.3
Total	2	100.0	5	100.0	7	100.0

Note: Because of multiple responses the percentages add up to more than 100

Conclusion: Most desirable features in hollow concrete blocks are low price, year round availability, good size and less porosity

3.8. Awareness

Given below are awareness level of builders regarding energy efficiency, comfort and environmental degradation related to the use of bangla bricks machine made bricks, hollow clay bricks and hollow concrete blocks

3.8.1 Environment

Responses about the awareness of builders about environmental degradation is given below

3.8.1.1 Damage to Environment

Responses regarding damage to environment are given below in Table 8.1.1

Table 8.1.1 : Damage To Environment

Type of Respondent	Do brickfields cause damage to environment							
	Yes		No		no response		do not know	
	Count	%	Count	%	Count	%	Count	%
Architect	12	100.0	0	.0	0	.0	0	.0
Commercial Builder	12	100.0	0	.0	0	.0	0	.0
Private Builder	11	91.7	0	.0	1	8.3	0	.0
Total	35	97.2	0	.0	1	2.8	0	.0

Conclusion: Almost all the builders believe that the present brickfields cause damage to environment

3.8.1.2 Changes in Method of Making Bricks

Responses regarding possible changes in the methods of making bricks are given below in Table 8.1.2

Table 8.1.2 : Should Methods Of Making Bricks Change

Type of Respondent	Should ways of brick making change to environmentally friendly methods							
	Yes		No		no response		do not know	
	Count	%	Count	%	Count	%	Count	%
Architect	12	100.0	0	.0	0	.0	0	.0
Commercial Builder	11	91.7	1	8.3	0	.0	0	.0
Private Builder	12	100.0	0	.0	0	.0	0	.0
Total	35	97.2	1	2.8	0	.0	0	.0

Conclusion: Almost all the builders believe that brick making should change to make it environmentally friendly

3.8.1.3 Willingness to Pay More for Bricks Made by Environmentally Friendly Methods

Responses regarding willingness of builders to pay more for the bricks that are made by environmentally friendly methods are given below in Table 8.1.3

Table 8.1.3 : Willingness To Pay More For Bricks Made By Environmentally Friendly Methods

Type of Respondent	Are you ready to pay more for bricks made by environmentally friendly methods							
	Yes		No		no response		do not know	
	Count	%	Count	%	Count	%	Count	%
Architect	10	90.9	1	9.1	0	.0	0	.0
Commercial Builder	10	83.3	0	.0	1	8.3	1	8.3
Private Builder	12	100.0	0	.0	0	.0	0	.0
Total	32	91.4	1	2.9	1	2.9	1	2.9

Conclusion: Nine out of ten builders are ready to pay more for the bricks that are made in an environmentally friendly way

3.8.1.4 How Much More

Responses regarding how much more are builders willing to pay more for the bricks that are made by environmentally friendly methods are given below in Table 8.1.4

Table 8.1.4 : How Much More

Type of Respondent	How much more are you ready to pay									
	5		10		15 or more		less than 5		no response	
	Count	%	Count	%	Count	%	Count	%	Count	%
Architect	0	.0	6	50.0	1	8.3	1	8.3	4	33.3
Commercial Builder	4	33.3	2	16.7	2	16.7	0	.0	4	33.3
Private Builder	3	25.0	6	50.0	1	8.3	0	.0	2	16.7
Total	7	19.4	14	38.9	4	11.1	1	2.8	10	27.8

Conclusion: Half of the builders are willing to pay 10% more for bricks made by environmentally friendly methods

3.8.2 Working and Living Environment

Responses to which type of bricks provide most comfortable working and living environment are given below in table 8.2

Table 8.2: Working And Living Environment In Building Made From Different Types Of Bricks

Provide Comfortable Working/ Living Environment	Type of Respondent								
		Architect		Commercial Builder		Private Builder		Total	
		Count	%	Count	%	Count	%	Count	%
Highest	Bangla bricks	6	50.0	0	.0	5	50.0	11	32.4
	Machine made bricks	4	33.3	4	33.3	0	.0	8	23.5
	Hollow clay bricks	1	8.3	7	58.3	2	20.0	10	29.4
	Hollow cement blocks	0	.0	1	8.3	0	.0	1	2.9
	do not know	1	8.3	0	.0	3	30.0	4	11.8
	Total	12	100.0	12	100.0	10	100.0	34	100.0
Second highest	Bangla bricks	2	20.0	3	25.0	0	.0	5	15.6
	Machine made bricks	6	60.0	4	33.3	3	30.0	13	40.6
	Hollow clay bricks	0	.0	3	25.0	0	.0	3	9.4
	Hollow cement blocks	0	.0	2	16.7	0	.0	2	6.3
	do not know	2	20.0	0	.0	7	70.0	9	28.1
	Total	10	100.0	12	100.0	10	100.0	32	100.0
Second lowest	Bangla bricks	0	.0	5	41.7	2	20.0	7	25.9
	Machine made bricks	1	20.0	5	41.7	0	.0	6	22.2
	Hollow clay bricks	2	40.0	2	16.7	0	.0	4	14.8
	Hollow cement blocks	0	.0	0	.0	0	.0	0	.0
	do not know	2	40.0	0	.0	8	80.0	10	37.0
	Total	5	100.0	12	100.0	10	100.0	27	100.0
Lowest	Bangla bricks	1	16.7	2	25.0	0	.0	3	12.5
	Machine made bricks	0	.0	2	25.0	0	.0	2	8.3
	Hollow clay bricks	0	.0	0	.0	0	.0	0	.0
	Hollow cement blocks	2	33.3	4	50.0	0	.0	6	25.0
	do not know	3	50.0	0	.0	10	100.0	13	54.2
	Total	6	100.0	8	100.0	10	100.0	24	100.0

Conclusion: Inconclusive response, showing lack of knowledge regarding relation of working and living environment to the type of bricks used

3.8.3 Insulation from Heat and Cold

Responses to which type of bricks provides highest insulation from heat and cold are given below in table 8.3. From the responses it is evident that the builders are not very much aware about the insulating properties of different types of bricks. That is why only 11 out of 36 have responded to this question and that too in an inconclusive manner.

Table 8.3: Insulation From Heat And Cold Provided By Different Types Of Bricks

Provides Insulation from Heat and Cold		Type of Respondent							
		Architect		Commercial Builder		Private Builder		Total	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Highest	Bangla bricks	2	18.2%	0	.0%	0	.0%	2	6.1%
	Machine made bricks	2	18.2%	3	25.0%	0	.0%	5	15.2%
	Hollow clay bricks	6	54.5%	6	50.0%	2	20.0%	14	42.4%
	Hollow cement blocks	1	9.1%	3	25.0%	0	.0%	4	12.1%
	do not know	0	.0%	0	.0%	8	80.0%	8	24.2%
	Total	11	100.0 %	12	100.0 %	10	100.0 %	33	100.0%
Second highest	Bangla bricks	3	33.3%	2	16.7%	0	.0%	5	16.1%
	Machine made bricks	3	33.3%	5	41.7%	2	20.0%	10	32.3%
	Hollow clay bricks	1	11.1%	4	33.3%	0	.0%	5	16.1%
	Hollow cement blocks	1	11.1%	1	8.3%	0	.0%	2	6.5%
	do not know	1	11.1%	0	.0%	8	80.0%	9	29.0%
	Total	9	100.0 %	12	100.0 %	10	100.0 %	31	100.0%
Second lowest	Bangla bricks	2	25.0%	6	54.5%	3	30.0%	11	37.9%
	Machine made bricks	4	50.0%	3	27.3%	0	.0%	7	24.1%
	Hollow clay bricks	0	.0%	0	.0%	0	.0%	0	.0%
	Hollow cement blocks	0	.0%	2	18.2%	0	.0%	2	6.9%
	do not know	2	25.0%	0	.0%	7	70.0%	9	31.0%
	Total	8	100.0 %	11	100.0 %	10	100.0 %	29	100.0%
Lowest	Bangla bricks	2	33.3%	3	42.9%	0	.0%	5	21.7%
	Machine made bricks	0	.0%	1	14.3%	1	10.0%	2	8.7%
	Hollow clay bricks	0	.0%	0	.0%	0	.0%	0	.0%
	Hollow cement blocks	1	16.7%	3	42.9%	0	.0%	4	17.4%
	do not know	3	50.0%	0	.0%	9	90.0%	12	52.2%
	Total	6	100.0 %	7	100.0 %	10	100.0 %	23	100.0%

Conclusion: The response is not very clear. But it generally indicates that the perception is that highest insulation is provided by hollow clay bricks followed by machine made bricks and lowest by hollow concrete blocks and second lowest by bangla brick

3.8.4 Embedded Energy

Embedded energy of a building is the total energy consumed by all the building materials used in the construction of that building. It will also include the energy used or stored in the individual building materials while they were manufactured, stored and transported to the site. Only 13 out of 36 have responded to this question. It seems the builders are not aware of the embedded energy that the building they make have in them.

Table 8.4: Embedded Energy

Embedded Energy		Type of Respondent							
		Architect		Commercial Builder		Private Builder		Total	
		Count	%	Count	%	Count	%	Count	%
Highest	Bangla bricks	1	12.5	3	37.5	0	.0	4	15.4
	Machine made bricks	0	.0	2	25.0	1	10.0	3	11.5
	Hollow clay bricks	2	25.0	0	.0	0	.0	2	7.7
	Hollow cement blocks	3	37.5	1	12.5	0	.0	4	15.4
	Do not know	2	25.0	2	25.0	9	90.0	13	50.0
	Total	8	100.0	8	100.0	10	100.0	26	100.0
Second highest	Bangla bricks	3	37.5	1	12.5	1	10.0	5	19.2
	Machine made bricks	2	25.0	3	37.5	0	.0	5	19.2
	Hollow clay bricks	0	.0	1	12.5	0	.0	1	3.8
	Hollow cement blocks	0	.0	1	12.5	0	.0	1	3.8
	Do not know	3	37.5	2	25.0	9	90.0	14	53.8
	Total	8	100.0	8	100.0	10	100.0	26	100.0
Second lowest	Bangla bricks	0	.0	1	14.3	0	.0	1	4.0
	Machine made bricks	3	37.5	0	.0	0	.0	3	12.0
	Hollow clay bricks	1	12.5	3	42.9	0	.0	4	16.0
	Hollow cement blocks	0	.0	1	14.3	0	.0	1	4.0
	Do not know	4	50.0	2	28.6	10	100.0	16	64.0
	Total	8	100.0	7	100.0	10	100.0	25	100.0
Lowest	Bangla bricks	1	14.3	0	.0	0	.0	1	4.3
	Machine made bricks	0	.0	0	.0	0	.0	0	.0
	Hollow clay bricks	1	14.3	1	16.7	0	.0	2	8.7
	Hollow cement blocks	1	14.3	3	50.0	0	.0	4	17.4
	Do not know	4	57.1	2	33.3	10	100.0	16	69.6
	Total	7	100.0	6	100.0	10	100.0	23	100.0

Conclusion: The response is inconclusive. It shows that the builders are not clear about the embedded energy of a building

3.9. Anticipated future trend in the use of different types of bricks

Response for the builders regarding their opinion about the future trends in the use of bricks will be is given below in Table 9

Table 9 : Anticipated Future Trend In The Use Of Different Types Of Bricks

Type of Respondent	Which types of bricks would be used more in future									
	Bangla bricks		Machine made bricks		Hollow clay bricks		Hollow cement blocks		no response	
	Count	%	Count	%	Count	%	Count	%	Count	%
Architect	2	16.7	3	25.0	2	16.7	4	33.3	1	8.3
Commercial Builder	0	.0	10	83.3	2	16.7	0	.0	0	.0
Private Builder	1	8.3	0	.0	2	16.7	9	75.0	0	.0
Total	3	8.3	13	36.1	6	16.7	13	36.1	1	2.8

Conclusion: Hollow cement blocks and machine made bricks will be used more in the future



CHAPTER 4

BASELINE INDICATORS

4. Baseline Indicators

Baseline indicators are the data that represent present day situation. These data may or may not change over years with or without interventions from external sources. GTZ intends to design and implement interventions that it expects to change the present day situation regarding awareness, understanding, acceptability and use of Hollow Clay Bricks. Five indicators are suggested as baseline as follow:

4.1 Indicator - Overall Use of Hollow Clay Bricks

This Indicator represents the sum total of hollow clay bricks used in any year as percentage of the total bricks used in that year. The base line for this year is 4% as shown in the Table 4.1.6 below:

Table 4.1.6: Overall Use Of Different Types Of Bricks

Type of Respondent	Percentage of bangla bricks	Percentage of pickets	Percentage of machine made bricks	Percentage of hollow clay bricks	Percentage of hollow concrete blocks
	Mean	Mean	Mean	Mean	Mean
Architect	53	8	38	2	1
Commercial Builder	47	1	36	8	8
Private Builder	68	23	8	2	0
Average	56	11	27	4	3

4.2 Indicator - Comparative Use of Different Type of Bricks

This indicator represents the percentages of hollow clay bricks used by builders in different parts of buildings. The baseline for hollow bricks is shown below in Table 4.1.5

Table 4.1.5: Comparative Use of Different Type of Bricks

For what purpose bricks are used	Bangla bricks		Machine made bricks		Hollow clay bricks		Hollow concrete blocks		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
Load bearing walls	20	66.7	8	26.7	1	3.3	1	3.3	30	100.0
Outside walls	32	48.5	22	33.3	9	13.6	3	4.5	66	100.0
Inside walls	31	47.0	17	25.8	15	22.7	3	4.5	66	100.0
Foundation	23	76.7	6	20.0		0.0	1	3.3	30	100.0
Boundary walls	31	63.3	11	22.4	5	10.2	2	4.1	49	100.0
Garage/outside store walls	29	72.5	9	22.5	1	2.5	1	2.5	40	100.0
Soling	33	89.2	4	10.8		0.0		0.0	37	100.0
Total Responded	34	42.0	25	30.9	17	21.0	5	6.2	81	100.0

Note: Because of multiple responses the percentages add up to more than 100.

4.3 Indicator - Knowledge and Skills in Laying Hollow Clay Bricks

This indicator represents builders' responses regarding proper knowledge and skill in laying of hollow clay bricks.

The baseline for hollow bricks is given below in Table 6.1.3

Table 6.1.3: Knowledge And Skills In Laying Hollow Clay Bricks

Type of Respondent	Proper knowledge and skills available for laying hollow clay bricks					
	Yes		No		No response	
	Count	%	Count	%	Count	%
Architect	6	50.0	5	41.7	1	8.3
Commercial Builder	5	41.7	6	50.0	1	8.3
Private Builder	0	.0	12	100.0	0	.0
Total	11	30.6	23	63.9	2	5.6

4.4 Indicator - Availability of Hollow Clay Bricks

This indicator represents responses from builders regarding availability of Hollow clay bricks. The baseline is shown below in Table 3.4

Table 3.4: Availability Of Hollow Clay Bricks

Type of Respondent	Hollow clay bricks sufficiently available			
	Yes		No	
	Count	%	Count	%
Architect	5	62.5	3	37.5
Commercial Builder	3	37.5	5	62.5
Private Builder	0	.0	11	100.0
Total	8	29.6	19	70.4

4.5 Indicator - Major Reasons for Not Using More of Hollow Clay Bricks

This indicator represents responses from builders regarding factors that they think are responsible for forcing them not to use hollow bricks even if they are available. The baseline is Builders gave the following reasons for not using more of hollow clay bricks as shown below in Table 4.2.3

Table 4.2.3: Major Reasons For Not Using More Of Hollow Clay Bricks

Reasons	Type of Respondent						Total	
	Architect		Commercial Builder		Private Builder		Count	%
	Count	%	Count	%	Count	%		
Not good strength			1	12.5			1	4.3
Not readily available	2	28.6	4	50.0	5	62.5	11	47.8
Do not know					2	25.0	2	8.7
Do not use					1	12.5	1	4.3
High price	3	42.9	4	50.0	5	62.5	12	52.2
Skilled labor not available					4	50.0	4	17.4
Not good looking			1	12.5			1	4.3
Breaks in utility lines	2	28.6	1	12.5			3	13.0
Dampness inside	2	28.6	1	12.5			3	13.0
Not good bonding			1	12.5			1	4.3
Uneven breaking	1	14.3					1	4.3
Total	7	100.0	8	100.0	8	100.0	23	100.0

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Fired clay bricks are being used as wall materials for centuries. Until the Industrial revolution of the 18th century most bricks were produced by hand and fired in small ovens. Since then though larger ovens called kilns were developed and put to use to fire the bricks. Some of these kilns are still in use in developing nations where post-nineteenth century refinements in kiln technology and brick making techniques are yet to take hold. Most prominently green bricks still continue to be made by hand; mechanization being the rarity. This age old method of making bricks has inhibited the development of newer types of bricks resulting in the continuation of age-old construction methods.

In Bangladesh too, as seen from the survey, builders still continue to employ traditional methods in constructing buildings and other infrastructure. This is especially so with Government departments which, in Bangladesh, is a large consumer of bricks. The survey shows that although architects and commercial builders are willing to use better quality and more energy efficient bricks, they are constrained by their supply and the knowledge and skills required in their use.

The report is compiled so that each table in Chapter 3 is accompanied by a summary of the findings with respect to the findings in the Table. The major barriers to the wide spread use of modern, energy efficient bricks can be summarized as follows:

Awareness: There is a significant lack of awareness by stakeholders and users of hollow bricks about the potential benefits that can be derived from using newer bricks; issues relating to life-cycle costs such as impacts on downstream construction costs, potential qualitative improvements in buildings and ease of adaptation are lacking;

Lack of knowledge and expertise: There is very little knowledge among architects and builders about hollow bricks, their use in design and construction of buildings. In Bangladesh use of bricks lack innovation and are done in a straightforward manner; the comparative benefits of using different types of bricks are not clear to the builders. Nor are they clear about the energy conservation and savings related to the different types of bricks. This is evident from the standard deviation calculated from the responses given by the builders.

5.2 Recommendations

It is clear from the survey analysis that there is considerable scope to improve the construction and building sector in Bangladesh Specific recommendations are given below.

Introduction of improved building materials especially hollow clay bricks and technologies would require interventions to improve awareness, skills and knowledge of the stakeholders in the industry. These types of interventions will remove barriers and help spread the use of bricks that use less resources in their making and improve downstream costs and quality.

Considering the present level of awareness, knowledge and skill of the builders and availability of hollow clay bricks it is recommended that for:

a. Awareness, Knowledge and Skills:

- e. Since the most powerful tool for dissemination is exposure, field trips for builders and architects should be organized to those countries where these products are used extensively and where building codes and standards are in place:
 - 1. Builders may be trained in the design of buildings using hollow clay bricks;
 - 2. A 15 to 20 minutes documentary film showing how hollow bricks are made, how they are used and the benefits that can be derived from their use, should be presented and distributed at a workshop; and
 - 3. Masons or bricklayers who are the main actors at the field level may be trained in the skills of laying hollow clay bricks

b. Supply side interventions:

- 1. Brick manufacturers must be trained in the methods of production of hollow clay bricks
- 2. As a first step, they should be exposed to how they are being made in China, where they are presently being made. In the second step, their production staff should be trained in the “art” of making hollow bricks through technique demonstration and “hands on” production training that is training them during production

c. Demand side interventions

- 1. One factor affecting demand for the product is the availability of masons who are adept at laying hollow bricks; their numbers are few and extremely limited in Bangladesh. This is obvious since the use of hollow bricks is almost non-existent. Bricklayers need to be trained. A program of training of trainers must be undertaken to ensure a core pool of bricklayers skilled at laying hollow bricks.
- 2. Builders must be made aware of the beneficial uses of hollow bricks with respect to costs and aesthetics. Comparative analysis showing these benefits should be undertaken and distributed to builders: manuals may be developed showing the comparative costs and benefits of using different types of brick and distributed among the builders
- 3. Manuals for green building technologies should also be developed and distributed to the Universities and builders



Terms of Reference	
Purpose of Assignment:	To conduct Baseline Survey of Commercial Builders, Private Builders and Architects on the present practice, availability, desirability, future trends, energy and environmental awareness regarding the use of solid bangla bricks, solid machine made bricks, hollow bricks and hollow concrete blocks
Terms of Reference:	<p>The Contractor will conduct a Baseline Survey of Commercial Builders, Private Builders and Architects on:</p> <ul style="list-style-type: none"> (i) Present practice of using solid bricks made in FCKs (bangla bricks), solid machine made (gas fired) bricks, hollow bricks and hollow concrete blocks (ii) Availability, quality and limitations of using solid bangla bricks, solid machine made bricks, hollow bricks and hollow concrete blocks (iii) Desirable features of solid bangla bricks, solid machine made bricks, hollow bricks and hollow concrete blocks (iv) Awareness level regarding energy efficiency, comfort and environmental degradation related to the use of solid bangla bricks, solid machine made bricks, hollow bricks and hollow concrete blocks (v) Anticipated future trend if new energy efficient and environmentally friendly technologies are introduced in brick making <p>For conducting the survey the contractor will:</p> <ul style="list-style-type: none"> ▪ Design and develop a strategy to collect the necessary data and finalize the methodology for obtaining sample data ▪ Prepare questionnaire for collecting data. ▪ Collect data from at least 30 Commercial Builders, Private Builders and Architects. ▪ Analyze data using statistical tools such as SPSS or other acceptable statistical methods and present findings as a report of not more than 10 pages
Period of Assignment:	March 1 to March 20, 2008
Reports:	Baseline Survey Report
Remuneration:	to be determined
Payments	to be determined
Remarks	n/a



GTZ: Survey Questionnaire for Architects

Clean Energy Alternatives (CEA), on behalf of GTZ is conducting this survey for project 'Promoting Hollow Bricks Usage'. Data collected for this survey will be used for research purpose only. Your kind cooperation is highly appreciated.

A: PROFILE OF ARCHITECTS

- a.1. Firms Name:
- a.2. Address
-
-
- a.3. Respondent's Name:
- a.4. Designation
- a.5. Phone:..... a. 6. Mobile:.....
- a.7. Sex: Female 1 Male 2

B: RESPONSE OF ARCHITECTS

- b.1. From which brickfield/s do you suggest to purchase bricks?
-
-
-
- b.2. Why do you suggest to purchase bricks from this/these brickfields?
- | | | | | | |
|----------------------|-----------------------------|------------------------|----------------------------|-----------------|----------------------------|
| Right Size | <input type="checkbox"/> 1 | Good Strength | <input type="checkbox"/> 2 | Good Finish | <input type="checkbox"/> 3 |
| Available Year Round | <input type="checkbox"/> 4 | Low Price | <input type="checkbox"/> 5 | Timely Delivery | <input type="checkbox"/> 6 |
| Available on Credit | <input type="checkbox"/> 7 | Good Price for Quality | <input type="checkbox"/> 8 | Good Color | <input type="checkbox"/> 9 |
| Good Shape | <input type="checkbox"/> 10 | | | | |
- Others (please specify)
-

.....
b.3. Do you get bricks as per your required specifications and finish?

Yes 1 No 2

b.4. Do you get bricks at the time you need them?

Yes 1 No 2

b.5. Does your client pay in advance for purchase of bricks?

Yes 1 No 2

b.6. What percentage of different types of bricks do you use?

b.6.1. Bangla bricks -----%

b.6.2. Pickets -----%

b.6.3. Machine made bricks -----%

b.6.4. Hollow clay bricks -----%

b.6.4. Hollow concrete blocks -----%

b.7. Availability

b.7.1. Are Bangla bricks sufficiently available? Yes 1 No 2

b.7.1.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.1.2 If no, what is the reason? _____

b.7.2. Are Picket bricks sufficiently available? Yes 1 No 2

b.7.2.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.2.2 If no, what is the reason? _____



b.7.3. Are Machine made bricks sufficiently available? Yes 1 No 2

b.7.3.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.3.2 If no, what is the reason? _____

b.7.4. Are Hollow clay bricks sufficiently available? Yes 1 No 2

b.7.4.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.4.2 If no, what is the reason? _____

b.7.5. Are Hollow concrete blocks sufficiently available? Yes 1 No 2

b.7.5.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.5.2 If no, what is the reason? _____

b.8 What features would you desire in the following types of brick?

b. 8.1 Bangla bricks 1.
2.
3.

b. 8.2 Machine made bricks 1.
2.
3.

b. 8.3 Hollow bricks 1.
2.
3.

b. 8.4 Hollow concrete blocks 1.
2.

3.

b.9 For what purpose do you use bangla bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3

Foundation 4 Boundary walls 5 Garage /outside Store walls 6

Soling 7 Others (please specify) -----

b.10. For what purpose do you use machine made bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3

Foundation 4 Boundary walls 5 Garage /outside Store walls 6

Soling 7 Others (please specify) -----

b.11. For what purpose do you use hollow bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3

Foundation 4 Boundary walls 5 Garage /outside Store walls 6

Soling 7 Others (please specify) -----

b.12 For what purpose do you use hollow concrete blocks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3

Foundation 4 Boundary walls 5 Garage /outside Store walls 6

Soling 7 Others (please specify) -----

b.13 Comparative construction advantages/ disadvantages:

Sl	Type of Brick	Labor	Cement	Wastage	Time	Cost of finishing	Cost of laying utilities	Aesthetic beauty
		1	2	3	4	5	6	7
1	Bangla bricks							
2	Machine made bricks							
3	Hollow bricks							
4	Hollow Concrete blocks							

Note: Grading on the scale of 1 to 4, where 4 is highest and 1 is lowest

b.14 Major reasons for using:

- b. 14.1 Bangla bricks 1.
 2.
 3.

- b. 14.2 Machine made bricks 1.
 2.
 3.

- b. 14.3 Hollow bricks 1.
 2.
 3.

- b. 14.4 Hollow concrete blocks 1.
 2.
 3.

b.15 Major reasons for not using:

- b. 15.1 Bangla bricks 1.
 2.
 3.

- b. 15.2 Machine made bricks 1.
 2.

3.

b. 15.3 Hollow bricks 1.

2.

3.

b. 15.4 Hollow concrete blocks 1.

2.

3.

b. 16 Is proper knowledge and skills available to lay the following types of bricks?

b.16.1 Bangla bricks Yes 1 No 2

b.16.2 Machine made bricks Yes 1 No 2

b.16.3 Hollow bricks Yes 1 No 2

b.16.4 Hollow concrete blocks Yes 1 No 2

17. Buildings using which types of bricks as wall materials use more maintenance?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is most and 1 is least, 5 is no response and 6 is do not know

18. What % of wastage during construction is there in the following types of bricks?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: 1 is no response and 2 is do not know

19. Building using which types of bricks as wall materials provide most comfortable

working/ living environment?

Bangla brick Machine made bricks Hollow bricks
Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is most comfortable and 1 is least, 5 is no response and 6 is do not know

20. Building using which types of bricks as wall materials provide more insulation to heat and cold?

Bangla brick Machine made bricks Hollow bricks
Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is highest and 1 is least, 5 is no response and 6 is do not know

21. Building using which types of bricks as wall materials has minimum embedded energy?

Bangla brick Machine made bricks Hollow bricks
Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is highest and 1 is least, 5 is no response and 6 is do not know

22. Do you think that the brickfields in Bangladesh cause damage to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

23. Do you think that the way bricks are made now should change to better ways that are less harmful to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

24. Which types of bricks do you anticipate would be used more in future?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: 2 is more and 1 is less, 3 is no response and 4 is do not know

25. Do you think you are ready to pay more for bricks that are made by methods that are less harmful to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

26. If yes how much % more are you ready to pay?

Note: 1= 5%, 2 = 10%, 3 = 15%, 4 = more than 15%, 5 = less than 5%, 6 = no response, 7 = do not know

1.1.2

1.1.3 INTERVIEW RECORD

Serial No.....

Date:.....

Name of the interviewer:.....

.....



GTZ: Survey Questionnaire for Commercial Builders

Clean Energy Alternatives (CEA), on behalf of GTZ is conducting this survey for project 'Promoting Hollow Bricks Usage'. Data collected for this survey will be used for research purpose only. Your kind cooperation is highly appreciated.

A: PROFILE OF COMMERCIAL BUILDERS

- a.1. Firms Name:
- a.2. Address
-
-
- a.3. Respondent's Name:
- a.4. Designation
- a.5. Phone:..... a. 6. Mobile:.....
- a.7. Sex: Female 1 Male 2

B: RESPONSE OF COMMERCIAL BUILDERS

- b.1. From which brickfield/s do you purchase bricks?
-
-
-
- b.2. Why do you purchase bricks from this/these brickfields?
- | | | | | | |
|----------------------|-----------------------------|------------------------|----------------------------|-----------------|----------------------------|
| Right Size | <input type="checkbox"/> 1 | Good Strength | <input type="checkbox"/> 2 | Good Finish | <input type="checkbox"/> 3 |
| Available Year Round | <input type="checkbox"/> 4 | Low Price | <input type="checkbox"/> 5 | Timely Delivery | <input type="checkbox"/> 6 |
| Available on Credit | <input type="checkbox"/> 7 | Good Price for Quality | <input type="checkbox"/> 8 | Good Color | <input type="checkbox"/> 9 |
| Good Shape | <input type="checkbox"/> 10 | | | | |
- Others (please specify)
-

.....
b.3. Do you get bricks as per your required specifications and finish?

Yes 1 No 2

b.4. Do you get bricks at the time you need them?

Yes 1 No 2

b.5. Do you pay in advance for purchase of bricks?

Yes 1 No 2

b.6. What percentage of different types of bricks do you use?

b.6.1. Bangla bricks -----%

b.6.2. Pickets -----%

b.6.3. Machine made bricks -----%

b.6.4. Hollow clay bricks -----%

b.6.4. Hollow concrete blocks -----%

b.7. Availability

b.7.1. Are Bangla bricks sufficiently available? Yes 1 No 2

b.7.1.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.1.2 If no, what is the reason? _____

b.7.2. Are Picket bricks sufficiently available? Yes 1 No 2

b.7.2.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.2.2 If no, what is the reason? _____



b.7.3. Are Machine made bricks sufficiently available? Yes 1 No 2

b.7.3.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.3.2 If no, what is the reason? _____

b.7.4. Are Hollow clay bricks sufficiently available? Yes 1 No 2

b.7.4.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.4.2 If no, what is the reason? _____

b.7.5. Are Hollow concrete blocks sufficiently available? Yes 1 No 2

b.7.5.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.5.2 If no, what is the reason? _____

b.8 What features would you desire in the following types of brick?

b. 8.1 Bangla bricks 1.
2.
3.

b. 8.2 Machine made bricks 1.
2.
3.

b. 8.3 Hollow bricks 1.
2.
3.

b. 8.4 Hollow concrete blocks 1.
2.

3.

b.9 For what purpose do you use bangla bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----

b.10. For what purpose do you use machine made bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----

b.11. For what purpose do you use hollow bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----

b.12 For what purpose do you use hollow concrete blocks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----

b.13 Comparative construction advantages/ disadvantages:

Sl	Type of Brick	Labor	Cement	Wastage	Time	Cost of finishing	Cost of laying utilities	Aesthetic beauty
		1	2	3	4	5	6	7
1	Bangla bricks							
2	Machine made bricks							
3	Hollow bricks							
4	Hollow Concrete blocks							

Note: Grading on the scale of 1 to 4, where 4 is highest and 1 is lowest

b.14 Major reasons for using:

- b. 14.1 Bangla bricks 1.
 2.
 3.

- b. 14.2 Machine made bricks 1.
 2.
 3.

- b. 14.3 Hollow bricks 1.
 2.
 3.

- b. 14.4 Hollow concrete blocks 1.
 2.
 3.

b.15 Major reasons for not using:

- b. 15.1 Bangla bricks 1.
 2.
 3.

- b. 15.2 Machine made bricks 1.
 2.
 3.



b. 15.3 Hollow bricks 1.
2.
3.

b. 15.4 Hollow concrete blocks 1.
2.
3.

b. 16 Is proper knowledge and skills available to lay the following types of bricks?

b.16.1 Bangla bricks Yes 1 No 2

b.16.2 Machine made bricks Yes 1 No 2

b.16.3 Hollow bricks Yes 1 No 2

b.16.4 Hollow concrete blocks Yes 1 No 2

17. Buildings using which types of bricks as wall materials use more maintenance?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is most and 1 is least, 5 is no response and 6 is do not know

18. What % of wastage during construction is there in the following types of bricks?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: 1 is no response and 2 is do not know

19. Building using which types of bricks as wall materials provide most comfortable working/ living environment?

Bangla brick Machine made bricks Hollow bricks
Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is most comfortable and 1 is least, 5 is no response and 6 is do not know

20. Building using which types of bricks as wall materials provide more insulation to heat and cold?

Bangla brick Machine made bricks Hollow bricks
Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is highest and 1 is least, 5 is no response and 6 is do not know

21. Building using which types of bricks as wall materials has minimum embedded energy?

Bangla brick Machine made bricks Hollow bricks
Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is highest and 1 is least, 5 is no response and 6 is do not know

22. Do you think that the brickfields in Bangladesh cause damage to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

23. Do you think that the way bricks are made now should change to better ways that are less harmful to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

24. Which types of bricks do you anticipate would be used more in future?

Bangla brick Machine made bricks Hollow bricks
Hollow concrete blocks Do not know/ no response

Note: 2 is more and 1 is less, 3 is no response and 4 is do not know

25. Do you think you are ready to pay more for bricks that are made by methods that are less harmful to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

26. If yes how much % more are you ready to pay?

Note: 1= 5%, 2 = 10%, 3 = 15%, 4 = more than 15%, 5 = less than 5%, 6 = no response, 7 = do not know

1.1.4 INTERVIEW RECORD

Serial No.....

Date:.....

Name of the interviewer:.....

.....



GTZ: Survey Questionnaire for Private Builders

Clean Energy Alternatives (CEA), on behalf of GTZ is conducting this survey for project 'Promoting Hollow Bricks Usage'. Data collected for this survey will be used for research purpose only. Your kind cooperation is highly appreciated.

A: PROFILE OF PRIVATE BUILDER

- a.1. Name:
- a.2. Address
-
-
- a.3. Phone:..... a. 4. Mobile:.....
- a.5. Sex: Female 1 Male 2

B: RESPONSE OF PRIVATE BUILDER

- b.1. From which brickfield/s do you purchase bricks?
-
-
-
- b.2. Why do you purchase bricks from this/these brickfields?
- | | | | | | |
|----------------------|-----------------------------|------------------------|----------------------------|-----------------|----------------------------|
| Right Size | <input type="checkbox"/> 1 | Good Strength | <input type="checkbox"/> 2 | Good Finish | <input type="checkbox"/> 3 |
| Available Year Round | <input type="checkbox"/> 4 | Low Price | <input type="checkbox"/> 5 | Timely Delivery | <input type="checkbox"/> 6 |
| Available on Credit | <input type="checkbox"/> 7 | Good Price for Quality | <input type="checkbox"/> 8 | Good Color | <input type="checkbox"/> 9 |
| Good Shape | <input type="checkbox"/> 10 | | | | |
- Others (please specify)
-
-

b.3. Do you get bricks as per your required specifications and finish?

Yes 1 No 2

b.4. Do you get bricks at the time you need them?

Yes 1 No 2

b.5. Do you pay in advance for purchase of bricks?

Yes 1 No 2

b.6. What percentage of different types of bricks do you use?

b.6.1. Bangla bricks -----%

b.6.2. Pickets -----%

b.6.3. Machine made bricks -----%

b.6.4. Hollow clay bricks -----%

b.6.4. Hollow concrete blocks -----%

b.7. Availability

b.7.1. Are Bangla bricks sufficiently available? Yes 1 No 2

b.7.1.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.1.2 If no, what is the reason? _____

b.7.2. Are Picket bricks sufficiently available? Yes 1 No 2

b.7.2.1 If no, then will you use more if sufficiently available?

Yes 1 No 2

b.7.2.2 If no, what is the reason? _____

b.7.3. Are Machine made bricks sufficiently available? Yes 1 No 2

b.7.3.1 If no, then will you use more if sufficiently available?



b.9 For what purpose do you use bangla bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----

b.10. For what purpose do you use machine made bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----

b.11. For what purpose do you use hollow bricks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----

b.12 For what purpose do you use hollow concrete blocks?

Load bearing walls 1 Exterior walls 2 Inside partition walls 3
Foundation 4 Boundary walls 5 Garage /outside Store walls 6
Soling 7 Others (please specify) -----



b.13 Comparative construction advantages/ disadvantages:

Sl	Type of Brick	Labor	Cement	Wastage	Time	Cost of finishing	Cost of laying utilities	Aesthetic beauty
		1	2	3	4	5	6	7
1	Bangla bricks							
2	Machine made bricks							
3	Hollow bricks							
4	Hollow Concrete blocks							

Note: Grading on the scale of 1 to 4, where 4 is highest and 1 is lowest

b.14 Major reasons for using:

- b. 14.1 Bangla bricks
1.
 2.
 3.

- b. 14.2 Machine made bricks
1.
 2.
 3.

- b. 14.3 Hollow bricks
1.
 2.
 3.

- b. 14.4 Hollow concrete blocks
1.
 2.
 3.

b.15 Major reasons for not using:

- b. 15.1 Bangla bricks
1.
 2.
 3.

- b. 15.2 Machine made bricks
1.
 2.

3.

b. 15.3 Hollow bricks 1.

2.

3.

b. 15.4 Hollow concrete blocks 1.

2.

3.

b. 16 Is proper knowledge and skills available to lay the following types of bricks?

b.16.1 Bangla bricks Yes 1 No 2

b.16.2 Machine made bricks Yes 1 No 2

b.16.3 Hollow bricks Yes 1 No 2

b.16.4 Hollow concrete blocks Yes 1 No 2

17. Buildings using which types of bricks as wall materials use more maintenance?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is most and 1 is least, 5 is no response and 6 is do not know

18. What % of wastage during construction is there in the following types of bricks?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: 1 is no response and 2 is do not know

19. Building using which types of bricks as wall materials provide most comfortable

working/ living environment?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is most comfortable and 1 is least, 5 is no response and 6 is do not know

20. Building using which types of bricks as wall materials provide more insulation to heat and cold?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is highest and 1 is least, 5 is no response and 6 is do not know

21. Building using which types of bricks as wall materials has minimum embedded energy?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: Grade 1-4, 4 is highest and 1 is least, 5 is no response and 6 is do not know

22. Do you think that the brickfields in Bangladesh cause damage to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

23. Do you think that the way bricks are made now should change to better ways that are less harmful to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

24. Which types of bricks do you anticipate would be used more in future?

Bangla brick Machine made bricks Hollow bricks

Hollow concrete blocks Do not know/ no response

Note: 2 is more and 1 is less, 3 is no response and 4 is do not know

25. Do you think you are ready to pay more for bricks that are made by methods that are less harmful to environment?

Note: 1 = yes, 2 = no, 3 = no response, 4 = do not know

26. If yes how much % more are you ready to pay?

Note: 1= 5%, 2 = 10%, 3 = 15%, 4 = more than 15%, 5 = less than 5%, 6 = no response, 7 = do not know

1.1.5 INTERVIEW RECORD

Serial No.....

Date:.....

Name of the interviewer:.....

.....

