

Bricks to Blocks: An Exploratory Study of a Policy and Practices in the Construction Sector of Bangladesh

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① Background

② Methodology

③ Findings

④ Conclusion

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Context

Types of Bricks and Blocks

Goal of the study

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Background: Context

- **Fired clay bricks(FCBs)** constitute over 90% of the bricks utilized in the construction sector of Bangladesh (Islam, 2016).
- **FCB** production is responsible for
 - Loss in agricultural topsoil
 - Crop yields
 - Air pollution
 - Health risks & Costs



Larry C. Price (2018)

Background: Context

- **Hybrid Hoffman Kiln (HHK)** is suggested as a relatively cleaner technology.
- **Hollow Concrete Blocks (HCB)** and **Interlocked Soil Stabilized Blocks (ISSB)** have lower CO2 emission, air pollution, and soil degradation.
- Constructing one square meter of wall using **blocks** has 52% to 65% less CO2 emission than **FCB** (Alam, 2020).

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Background: Types of Bricks and Blocks

(a) Fixed Chimney Bull Trench Kiln (FCBTK)



(b) Hybrid Hoffman Kiln (HHK) bricks



(c) Hollow Concrete Blocks (HCB)



(d) Interlocked Soil Stabilized Blocks (ISSB)



Image Credits: (a) Fruggo (b) Mumit M/TBS (c) Katorisi (d) www.nyumbabora.co.ke

Background: Types of Bricks and Blocks

(a) Fixed Chimney Bull Trench Kiln (FCBTK)



Material: Clay
Absorption capacity (%) : 18
Crushing strength (kg/cm²): 173

(b) Hybrid Hoffman Kiln (HHK) bricks



Material: Clay
Absorption capacity (%) : 13
Crushing strength (kg/cm²): 351

(c) Hollow Concrete Blocks (HCB)



Material: Cement, Sand, Gravel
Absorption capacity (%) : 7
Crushing strength (kg/cm²): 153

(d) Interlocked Soil Stabilized Blocks (ISSB)



Material: laterite, cement, and coarse sand
Absorption capacity (%) : 14.5
Crushing strength (kg/cm²): 253

Source: (Alam, 2020)

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Background: Goal of the study

- Adoption of brick-to-block policy in Bangladesh in 2019
- Motivations behind the policy: low carbon emissions, reduced soil degradation, and air pollution

Fiscal Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Target (%)	10%	20%	30%	60%	80%	100%

- This study aims to explore the current progress of the policy and identify any bottlenecks in its implementation.

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Methodology

- Mixed-method approach
 - Cross-sectional survey
 - 480 contractors from 16 districts
 - Key informant interviews (KIIs) with relevant govt. officials and block producers.

National Level	District Level
6	8
CPTU, PWD, DOE, HBRI, Additional Secretary, Eco Home Solution	DOE, PWD, LGED

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Survey Findings
KII Findings

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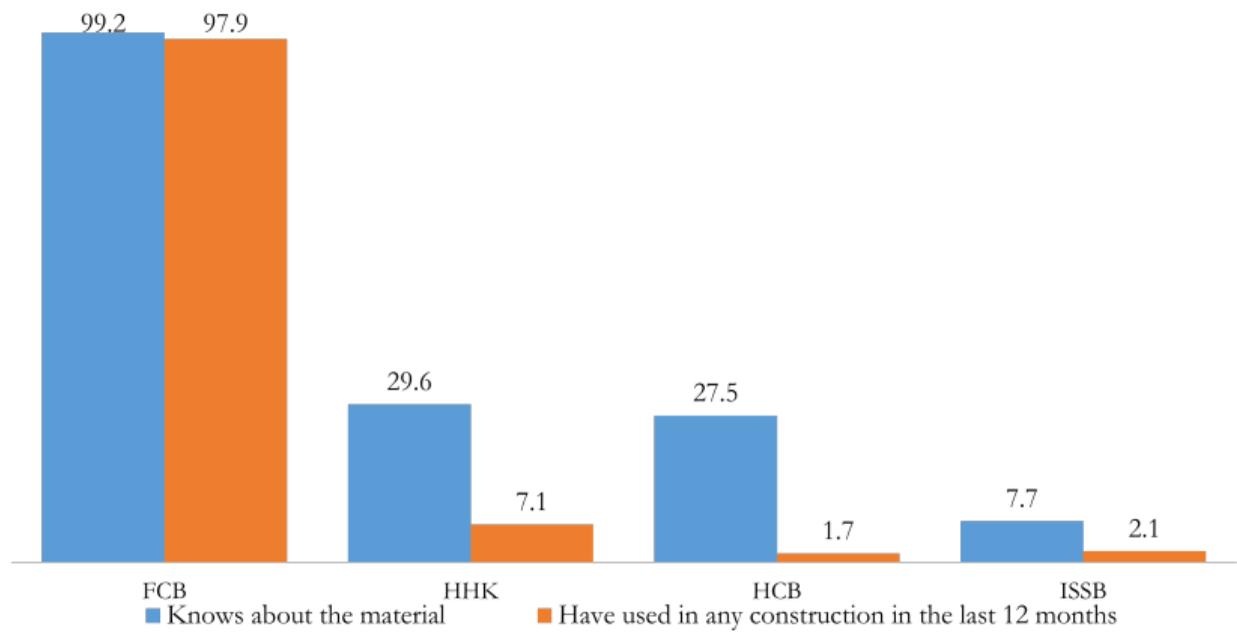
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 - Survey Findings
 - KII Findings
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Profile of the contractors by their awareness of the policy

Characteristics	Aware about the 2019 policy		t-stat
	Yes	No	
Age of the owner (mean in years)	44.5	43.8	0.77
Education of the owner is graduate and above (%)	52	44	1.50
Construction contract is the main occupation (%)	87	79	2.05**
Years of experience as a contractor (mean years)	17.8	17.8	0.05
Bids for any government work (%)	88	87	0.35
Bids for any private or NGO work (%)	31	17	3.51***
Number of observations	125	355	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Knowledge & use of construction material



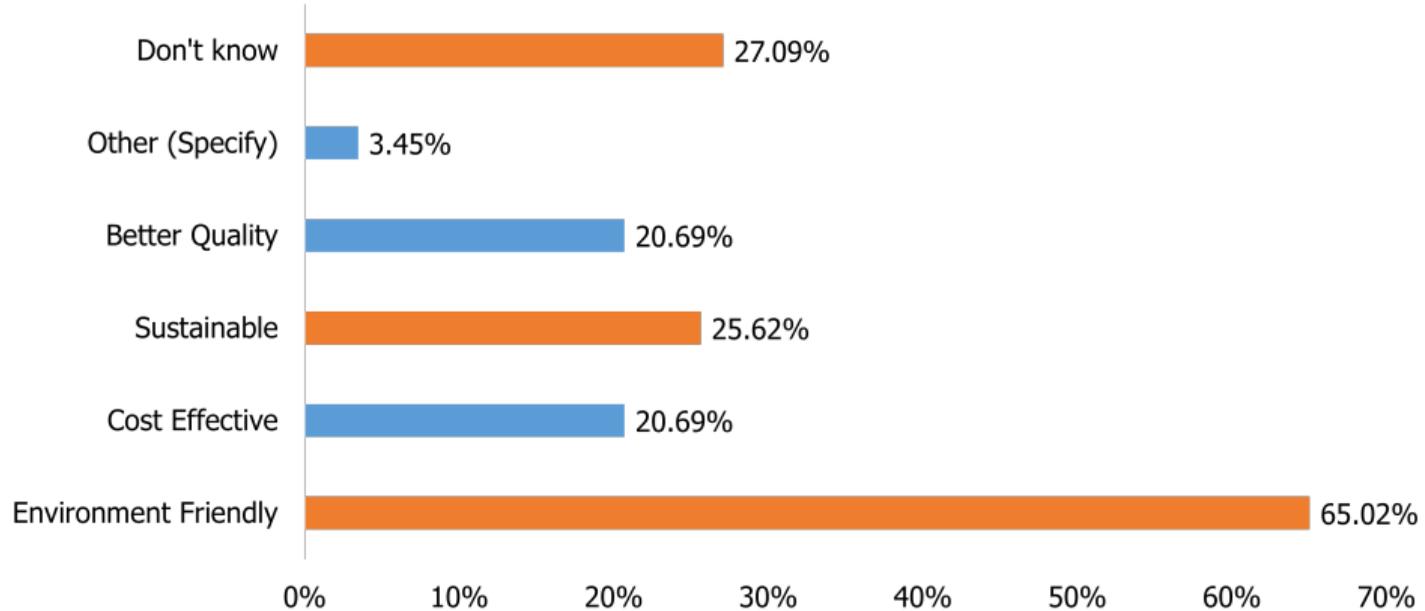
Advantages of different materials

Advantages	FCB		HHK		HCB		ISSB	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Cheap/low cost	112	55.17	14	6.9	10	4.93	4	1.97
Easily available	162	79.8	21	10.34	4	1.97	0	0
Better quality	34	16.75	71	34.98	31	15.27	19	9.36
-	-	-	-	-	-	-	-	-
Easy to work with/low labor cost	36	17.73	24	11.82	23	11.33	7	3.45
Don't know	4	1.97	73	35.96	116	57.14	156	76.85
Total (n=203)	425		328		281		241	

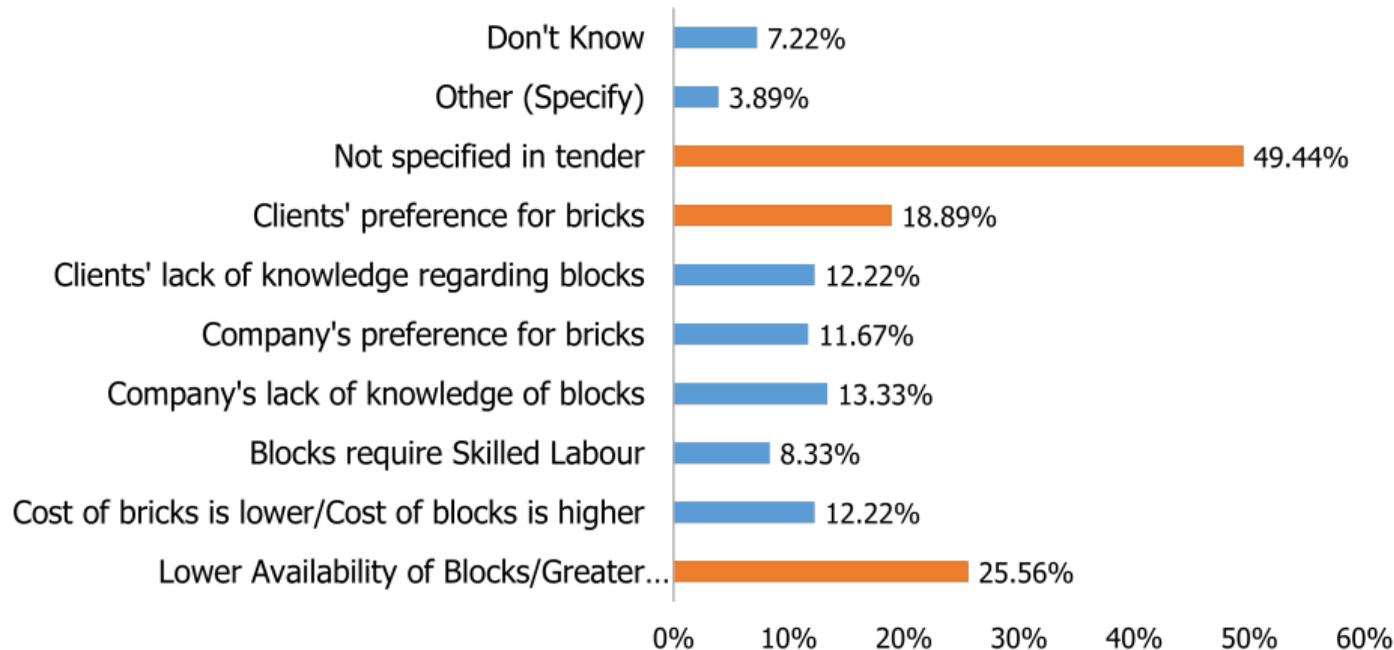
Disadvantages of different materials

Disadvantages	FCB		HHK		HCB		ISSB	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
High cost	15	7.39	35	17.24	18	8.87	15	7.39
Not easily available/high transport cost	3	1.48	35	17.24	28	13.79	11	5.42
-	-	-	-	-	-	-	-	-
Causes more environmental pollution to make	87	42.86	16	7.88	0	0	0	0
Don't know	6	2.96	79	38.92	120	59.11	155	76.35
Total (n=203)	286		252		236		218	

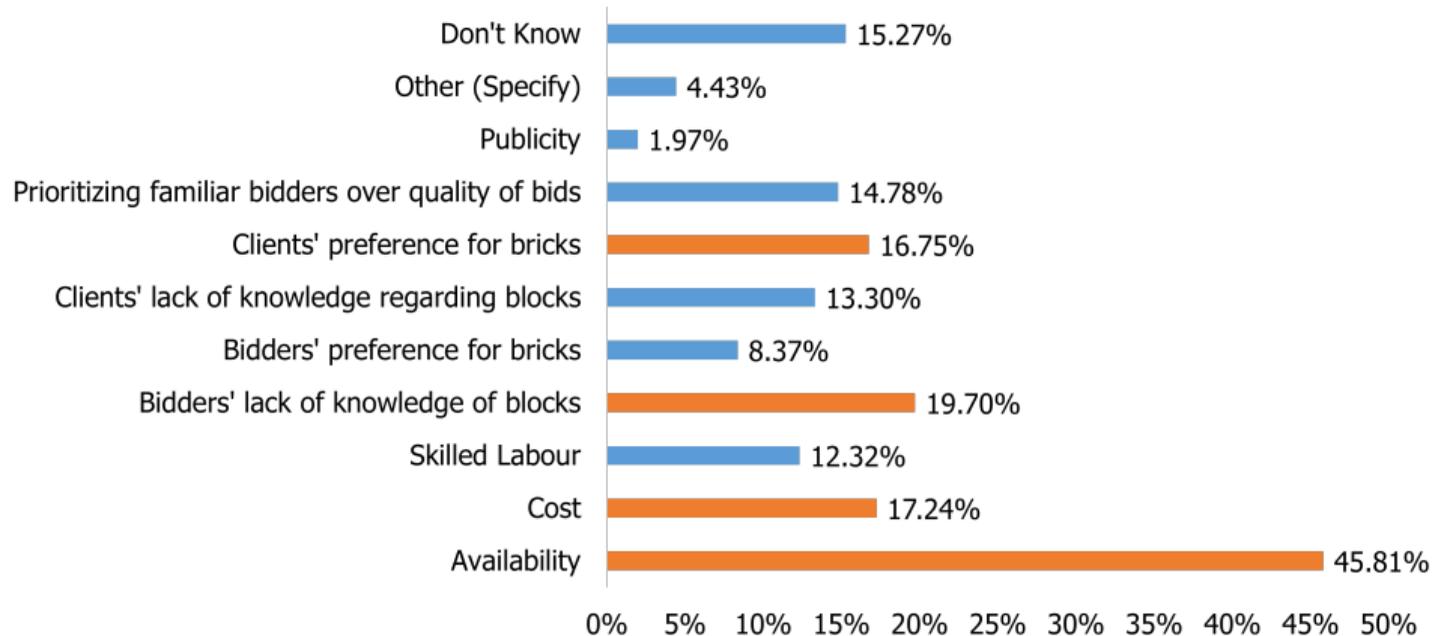
Reasons GoB's policy promotes blocks over FCBs



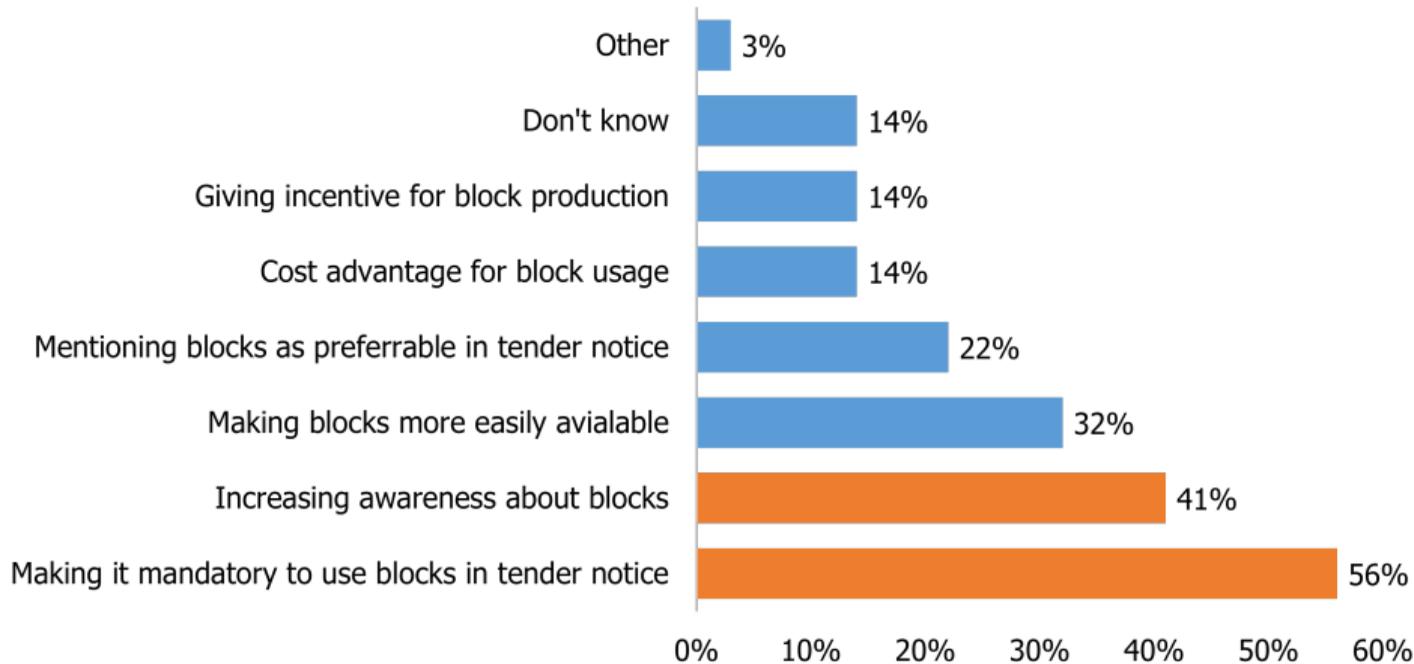
Reasons for not using blocks



Barriers to greater adoption of blocks in public construction



Ways to increase use of blocks in public procurement



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Status of policy implementation

Fiscal Year	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Target (%)	10%	20%	30%	60%	80%	100%

- A few key informants noted that the set targets were unrealistic.
 - No plans to revise the current targets till now.
- Slow Progress and Lack of tracking and monitoring system
 - Each ministry is supposed to provide updates every four months, but it has not been fully implemented

Comparison between blocks and FCBs

- Comparing blocks and FCBs
 - Differences in prices of blocks and FCBs
 - Lower cost compared to FCBs
 - Reduction in weight of the building
 - Benefits of reduced foundation size, column size, iron rod requirements, and earthquake effects
- Environmental benefits of blocks
 - Reduction in waste materials

Disadvantages of using blocks

- Disadvantages of using blocks
 - Bonding can become weaker due to less surface available for mortar
 - Cracks can develop in the wall if the walls are used for nailing or electrical wiring
 - Improper curing can weaken the walls
 - Damage during transportation

Bottlenecks reported by KIIs

- Bottlenecks reported by KIIs
 - Kiln owners are influential and directly involved in politics.
 - Lesser availability of blocks
 - Separate skillset required for blocks
 - Block construction may take more time compared to FCBs

Challenges faced by block producers

- Challenges faced by block producers
 - Lack of demand for blocks
 - Access to capital for starting block manufacturing
 - Green financing scheme needs to be increased
 - Availability of raw materials
 - Discouragement for opening letter of credit (LC) to import raw materials

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Conclusion

- **Policy Aim:** Promote sustainable technologies in construction sector and reduce environmental impacts
- **Challenges:**
 - Slow progress
 - Lack of monitoring and data collection system
 - Concerns about durability of blocks
- **Next steps:** Experimental study to promote eco-friendly blocks for sustainable construction in Bangladesh.
- **Recommendations:**
 - Specify the use of blocks in tender documents.
 - Increase visibility of policy to procurement officials and contractors.
 - Conduct demonstration to reduce misperceptions about block.
 - Collaboration among ministries, contractors, and experts.

for suggestions/questions please email:
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Thanks!

References

- Islam, M. S. (2016) “Potentials of Green Bricks/Alternative Energy Efficient Materials for Rural Housing in Bangladesh” , conference paper, China-Bangladesh ‘Market Transformation of Energy Efficient Bricks and Rural Buildings’ Technology and Experience Sharing
- Alam, F. (2020) “An Analysis of Alternative Building Materials in the Coastal Rural Areas of Bangladesh” , Skolan för Industriell Teknik Och Management, Stockholm.

Appendix A: Advantages of Different Materials

Advantages	FCB		HHK		HCB		ISSB	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No advantages	10	4.93	10	4.93	5	2.46	7	3.45
Cheap/low cost	112	55.17	14	6.9	10	4.93	4	1.97
Easily available	162	79.8	21	10.34	4	1.97	0	0
Better quality	34	16.75	71	34.98	31	15.27	19	9.36
Quality can be observed easily	19	9.36	26	12.81	16	7.88	7	3.45
Easy to work with/low labour cost	36	17.73	24	11.82	23	11.33	7	3.45
Requires less cement/mortar	3	1.48	27	13.3	20	9.85	8	3.94
Causes less environmental pollution to make	2	0.99	31	15.27	20	9.85	5	2.46
Clients prefer this material	27	13.3	6	2.96	0	0	4	1.97
Durability	3	1.48	17	8.37	22	10.84	15	7.39
Other, specify	13	6.4	8	3.94	14	6.9	9	4.43
Don't know	4	1.97	73	35.96	116	57.14	156	76.85
Total (n=203)	425		328		281		241	

Appendix B: Disadvantages of Different Materials

Disadvantages	FCB		HHK		HCB		ISSB	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
No disadvantages	67	33	39	19.21	28	13.79	20	9.85
High cost	15	7.39	35	17.24	18	8.87	15	7.39
Not easily available/high transport cost	3	1.48	35	17.24	28	13.79	11	5.42
Not good quality/not durable	40	19.7	9	4.43	3	1.48	5	2.46
Difficult to assess its quality	21	10.34	10	4.93	5	2.46	2	0.99
Difficult to work with/high labour cost	6	2.96	6	2.96	15	7.39	6	2.96
Requires more cement as mortar	24	11.82	7	3.45	2	0.99	1	0.49
Causes more environmental pollution to make	87	42.86	16	7.88	0	0	0	0
Clients do not like this material	2	0.99	5	2.46	5	2.46	1	0.49
Other, specify	15	7.39	11	5.42	12	5.91	2	0.99
Don't know	6	2.96	79	38.92	120	59.11	155	76.35
Total (n=203)	286		252		236		218	