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Geo-Spatial Distribution and Comparative Assessment of Brick Kiln Industry: Appraisal on Kulpi Block in Diamond Harbour Sub-Division, South 24 Parganas, West Bengal

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Abstract: ***Brick is one of the most important building materials and the demand of it is continuously rising for high increasing of population and the demand for settlement growth. Brick kilns in India are considered by traditional types of manufacturing and established as a significant industry in the unorganized sector. Percentage of female worker is more than male and in most of the cases total family be involved. Indian brick industry is the second biggest in the world after the China which provides livelihood. Among 9 Blocks of Diamond Harbour Sub-Division, Kulpi is the largest block based on number of brick kiln industry. Total brick kiln of the Sub division is 101. But Kulpi has 44 Brick Kilns (equal to 43.46%) covering an area of 60,000 Bigha or 80.3 Sq. Kms acquiring 25.83 % area of the Block itself. Author has attempted to observe the geo-spatial scenario and analysis of brick kiln industry of Kulpi block.***

Keywords: Locational Status, Brick Kiln Industry, Distribution, Comparison, Analysis, Kulpi Block

I. INTRODUCTION

Brick kiln industry (BKI) is an unorganized and labour-intensive industry. Demand of bricks for modern urbanization and housing, has become a great employment generation industry for unskilled labour. Kulpi is a community development block in Diamond Harbour S.D.

Near about half (44 among 101) of the Brick kilns are lying in this block of S.D. So, this area is playing a great role for job opportunity and attract out migration from different parts of the state and outside.

People engaged themselves whole of the year in this industry with various types of work from tilling the soil to distribution. Nearly 18000 workers are involved in this brick kiln where more than 40% are women. The brick kiln industry has taken an essential role for economic development of this area basically for the less literate persons.

II. BACKGROUND OF THE STUDY

Diamond Harbour is one of the renewed sub- divisions out of 5 in District South 24 Parganas,West Bengal in India. Since 70s this industry has started to concentrate here.

There are 44 kilns in Kulpi out of total 101of the sub-division, covering 43.56 in percentage. Still now, no research work has been done on kulpi BKI. So, it has been chosen under my consideration as study area. Nearly 1/4th area of the block at present is under brick kiln industrial area.

III. LOCATION OF STUDY AREA

Kulpi CD block is one of the famous, located at 22°04′53″N 88°14′42″E under Diamond harbour sub-division in South 24 Parganas. Average elevation of the block is 6 metres (20 ft). Block is bounded by Diamond Harbour I and Magrahat I CD blocks in the north, Mandirbazar, Mathurapur I blocks in east, Kakdwip CD block in the south and Haldia, Sutahata CD blocks in Purba Medinipur district, across the Hooghly, in the west.

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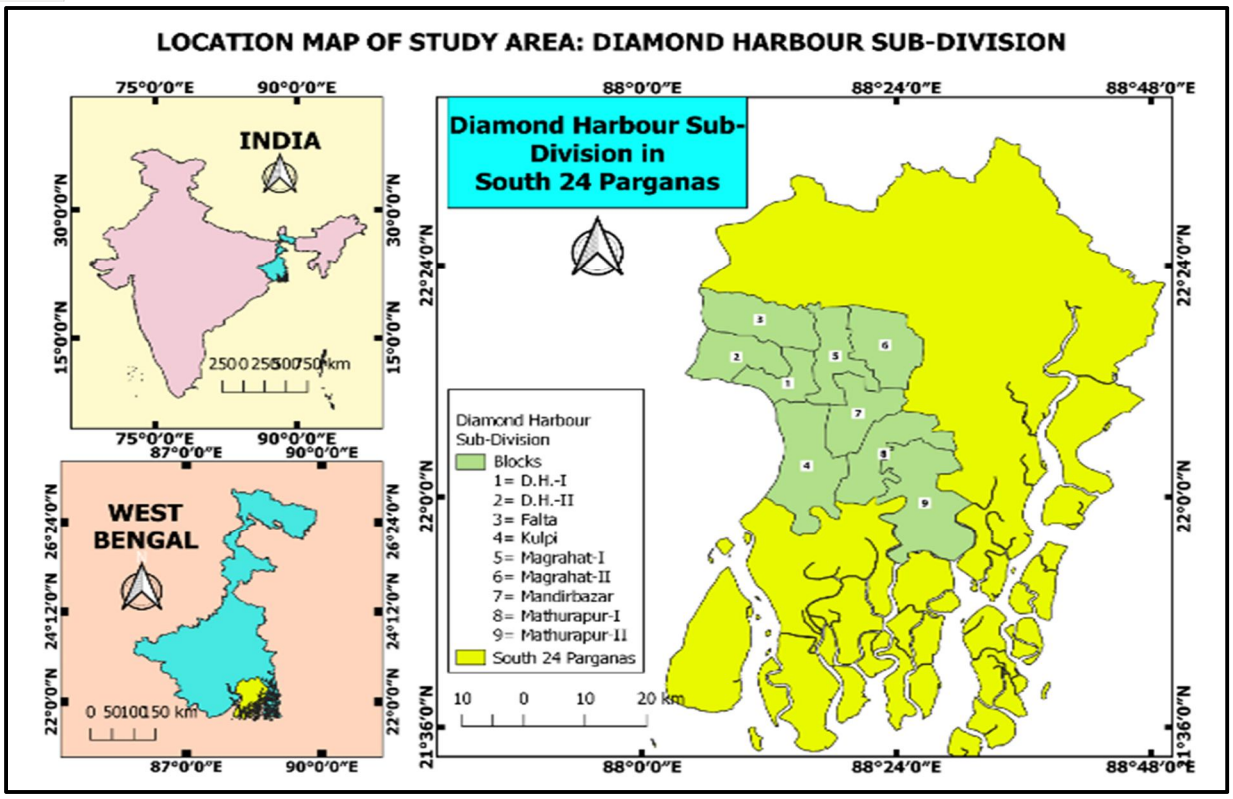


Fig.-1: Location Map [Source: Map prepared by the Author from QGIS]

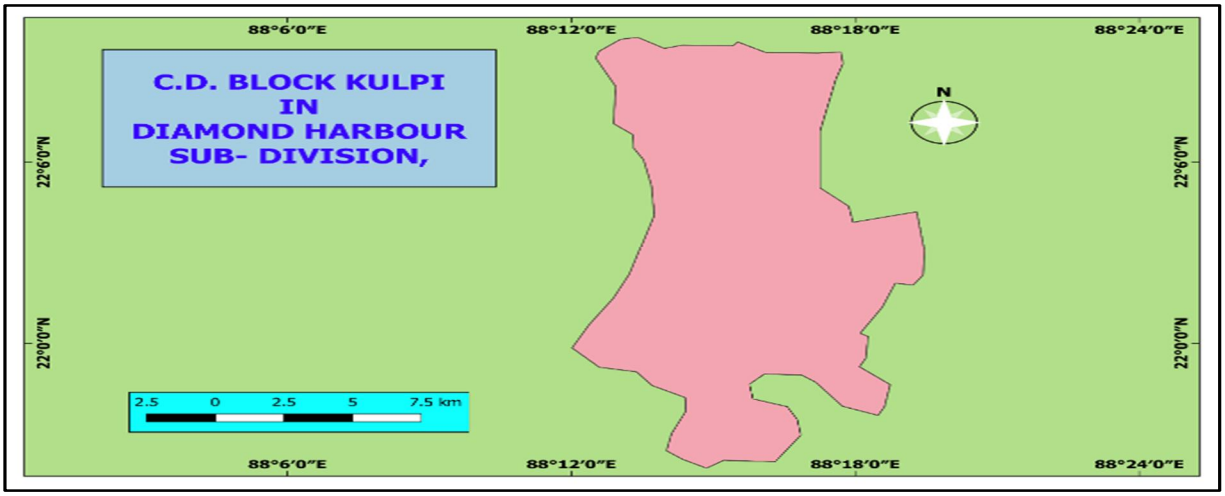


Fig.-2: Kulpi Block [Source: Prepared by the Author from QGIS]

IV. OBJECTIVES OF THE STUDY

A. To Highpoint the Geo-Spatial distributional Scenario of Brick Kiln Industry of Kulpi Block.
B. To Highlights Block wise locational comparison of Brick Kiln Industry.
C. To Prepare a Brick Kiln Industrial Zoning Map (BKIZM) of Sub-division.

V. RESEARCH METHODOLOGY

A. Sample Selection
1) Universe: 101 BKI 0f Diamond Harbour Sub-Division (in 9 Blocks)
2) Sample Unit: Kulpi Block (Maximum Dense Block in S.D Block)
3) Sample Size: 44 BKI (100%) of Kulpi Block

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B. Data Collection

The Primary and secondary both data has used for this present research study. The data has been collected from numerous bases and sources, like-

1) *Primary Source:* By field survey at Block levels in March, 2020 over questionnaire schedule, the Primary data has been collected.
2) *Secondary Source:* Mainly from Blocks and Census, Books, Journals and newspaper, website, secondary data has been collected.

C. Data Analysis

These collected data have analyzed by the application of geo-informatics, Modern software like Q-GIS, Google Earth Pro, Bhuvan, with cartographic depictions and statistical tool by the author.

VI. DISCUSSION AND ANALYSIS OF THE STUDY

The research work has been done analysed by various and versatile corners as follows: -

A. Distributional Scenario of BKI in Kulpi

1) Total BKI of the Block is 44, that is 43.46 % of total sub-divisional Brick Klin.
2) All kilns are located just on the eastern bank of the Hooghly River.
3) Each kiln is placed along the western part of the Kulpi Block towards south to north.
4) Kilns are situated from 22º03'20" N, 88º13'17" E (in Jadabnagar, BKI No. -1) to 22º07'25" N, 88º12'57"E (in Raytala, BKI No. -43) with a latitudinal extension of near about 4 minutes and longitudinal extension of less than 1 minuet.
5) Total area covered by BKI in Kulpi block is around 60,000 bigha or 80.3 sq. Kms (1 bigha is 0.0013378038 sq. Kms.)
6) Acquired Area by BKI is 25.83 % which near ¼ th of the Block (Total area of Kulpi block=310.83 Sq. Kms).
7) Out of 44 kilns of Kulpi Block, 42 are active still but 2 has stopped.

Table-I: Distribution of BKI: Kulpi Block

Administrative Location & Geographical Distribution: BKI of Kulpi Block-2020-21							
Direction	Extension		Village Name	Panchayet	Post Office	No. of BKI	% Of BKI
	Latitudinal	Longitudinal					
	22º03'20" N to 22º7'25" N,	88º12'57 "E to 88º13'17" E	JadabNagar	Ramkrishna	Kulpi	3	6.82
			DurgaNadgar	Kulpi	Kulpi	19	43.18
			Masamari		PaschinGopalnagar	8	18.18
			InchhinBaria		Shyambasu Chak	7	15.91
			Raytala	Ram-Kishore	Radhanagar	7	15.91
Total			5	3	4	44	100

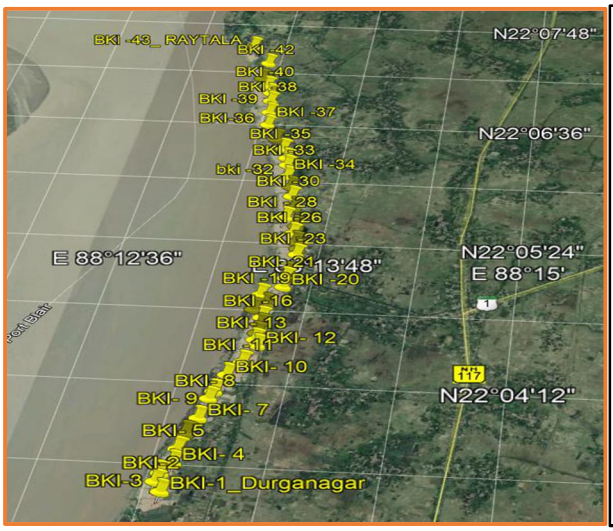
[Source: Field Survey, Satellite Image and Calculated by Author]

8) There are only 5 villages where the BKI are existing. According to geographical South to North these are-Jadabnagar, Durganagar,Masamari, Inchinberia and Raytala respectively (Tab.-I).
9) Among Kulpi block, Durganagar is highly concentrated Brick kiln are. 43.18% kiln (19 in Number) is locating here.
10) Second zone is Mansamari, covers 18.18% kiln which in number of eight.
11) Third place have taken two village- Raytala and Inchhinbaria, occupies 15.91% brick kiln of kulpi block.
12) Lowest concentrated zone is Jadabnagar, lying 6.82% of BKI among Kulpi block (Tab.-I).
13) Brick kiln village-

Village of Kulpi Block		
Type	Inhabited Village	BKI Located Village
Total No.	172	5
in %	100	2.91

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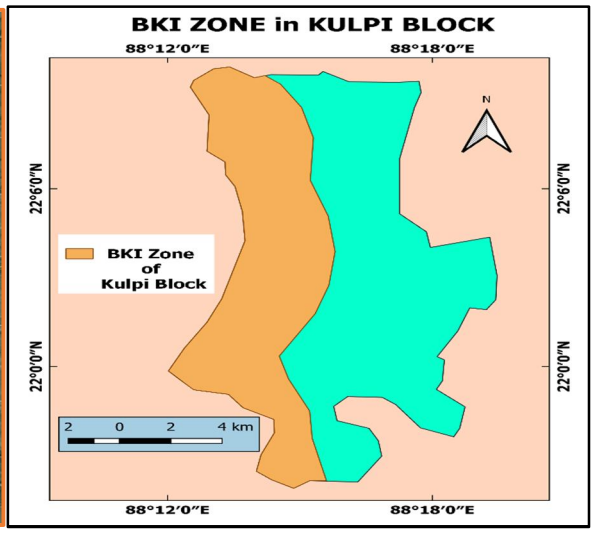
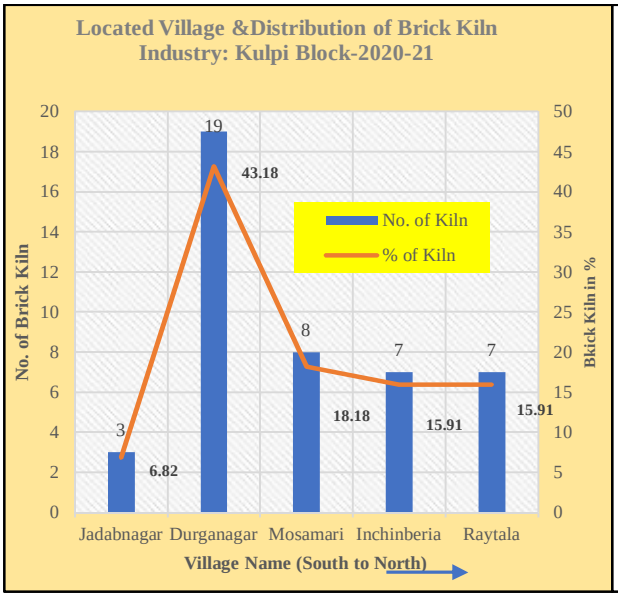


Fig.-3 (Location of BKI, Kulpi) & Fig.- 4: [Source: Prepared by the Author from Google Earth Pro & QGIS]



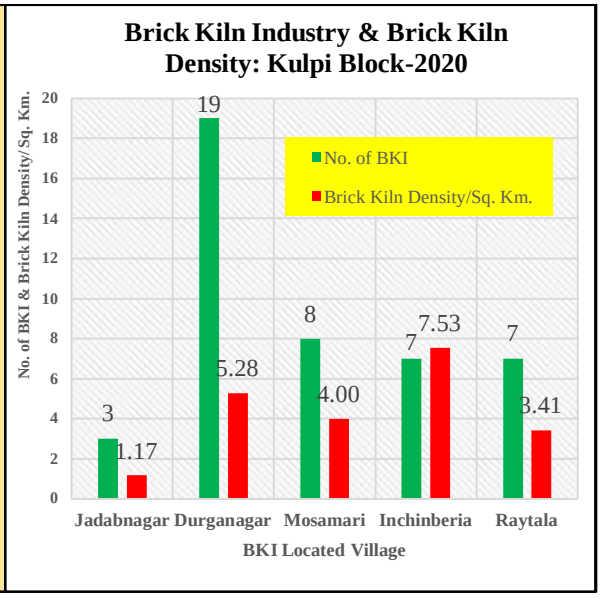


Fig.- 5: Distribution of BKI in Kulpi Block (Source: Tab. No.-I) Fig. -6: BKI Density Based on Table-II

B. Population and Brick Kiln Density of BKI Occupied Village in Kulpi Block

Table-II: Population, Area, and Various Density.

Sl. No.	Village Name	Population	Area (Hectare)	Area in Km	No. of BKI	No. of House hold	Pop. Density /Sq.Km.	Brick Kiln Density /Sq. Km.)	Household Density /Sq. Km)
1	Jadabnagar	2172	256.71	2.57	3	509	845.14	1.17	198.05
2	Durganagar	4274	359.96	3.6	19	1071	1187.22	5.28	297.50
3	Mosamari	3297	199.96	2	8	749	1648.50	4.00	374.50
4.	Inchinberia	1208	92.66	0.93	7	274	1298.92	7.53	294.62
5	Raytala	2775	205	2.05	7	662	1353.66	3.41	322.93

Source: Census Data, Field Survey and Calculated by Author [N.B.: 1 Hectare = 0.1 Km Or 0.01 Sq. Km); Brick kiln density= No. of Brick kiln/Sq. Km.]

Brick kiln density is the number of BKI per sq. km. area. Highest number of brick industry is locating in Durganagar village. But the major brick kiln density village is Inchinbaria (Table-II & Fig.-6) due to his less area.

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C. Block Level Distribution & Comparison of BKI: Diamond Harbour Sub-Division

Kulpi, the study area is the major block in percentage of kiln in the S.D. There are 44 kiln which is 43.56%. But 2nd and 3rd position has taken Falta and Diamond harbour-II, lying 18.81% and 17.82% separately (Tab.-III & Fig.-8). But Block Mathurapur and Magrahat-I has no kiln, it is kiln free are as per Government record. The condition of other blocks is showing table below.

Table-III: Block Level Distribution BKI: Diamond Harbour Sub-Division

Sl. No.	Blocks Name	Total Brick Kilns	Brick Kiln in %
1	Diamond Harbour-I	13	12.87
2	Diamond-Harbour-II	18	17.82
3	Falta	19	18.81
4	Kulpi	44	43.56
5	Magrahat-I	0	0.00
6	Magrahat-II	5	4.95
7	Mandirbazar	1	0.99
8	Mathurapur-I	0	0.00
9	Mathurapur-II	1	0.99

[Source: Field Survey and Calculated by Author]

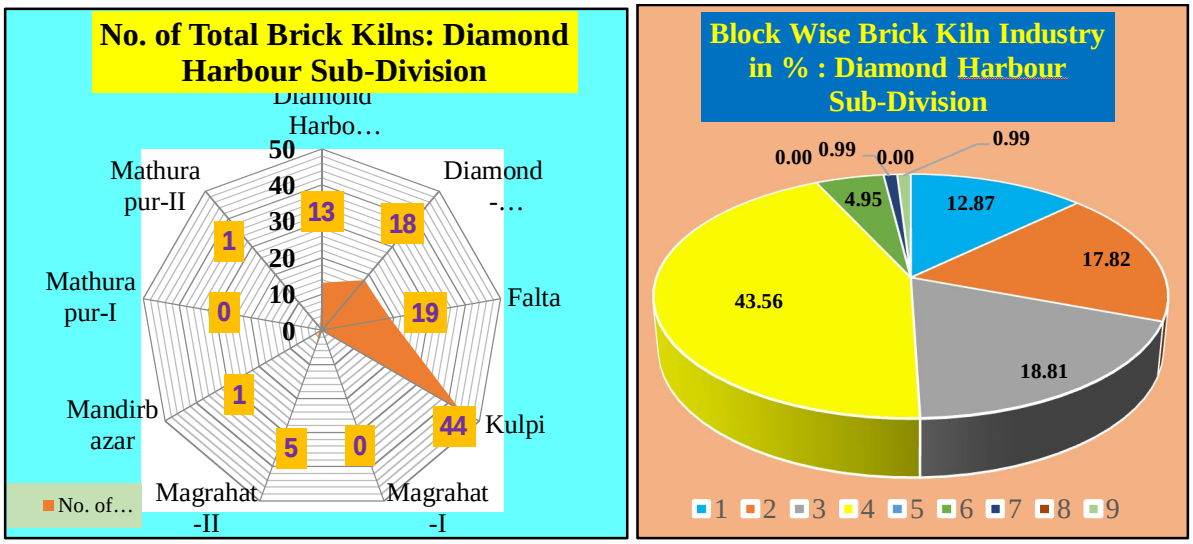


Fig.- 7 & Fig.- 8

The distribution of Brick kiln industry has shown below (Fig.-9) through the bar presentation. It reveals prominently, the study area is the main area according to important of kiln.

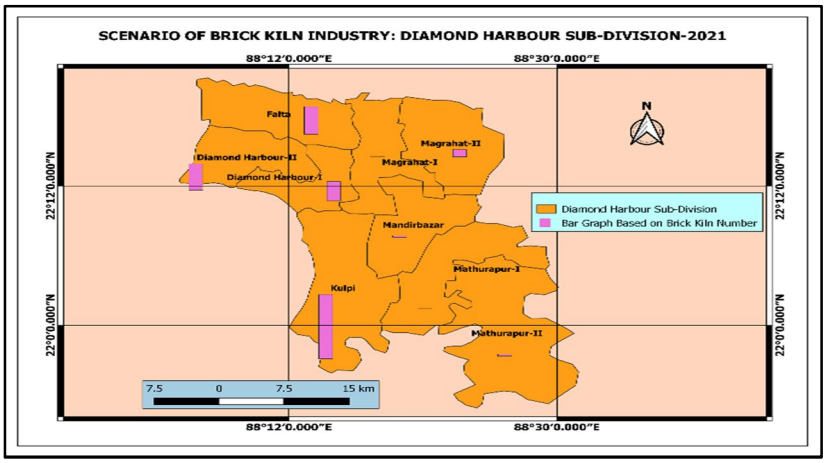


Fig.-9: BKI of Diamond Harbour SD [Map Source: Prepared by the Author from QGIS]

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D. Brick Kiln Industrial Zones of Diamond Harbour Sub-Division

Among the 9 blocks of the sub division, there is minimum existence of BkI is zero and maximum is forty-four. On the basis of the number of the kiln the author has divided into 5 separate zones (Tab.-IV, Fig.-10). There are two blocks (Mathurapur –I & Magrahat-I) are the kiln less zone, that is zero concentrated zone. Mandirbazar block and Mathurapur-II are in low concentrated zone, lying one kiln. The third zone is Moderate concentrated zone (Range 1-15), occupying the blocks of Magrahat-II (No. of kiln is 5) and Diamond Harbour-I (Kiln is 13). In the high brick kiln concentrated zone (Range 15-20) block Falta (Kiln is 19) and Diamond Harbour-II kiln is 18) have taken their place. But our study area Kulpi Block is under the very highly concentrated zone range of 20 to 45(Tab.-IV, Fig.-10). In this block there are 44 Brick kiln. But now 42 are active and 2 has stopped.

Table-IV: Sub-Divisional Brick Kiln Industrial Zone

Brick Kiln Concentration Zone: Diamond Harbour Sub-Division				
Zone	Zone Type	Range (No. of Kiln)	Name of the Block	No. of Block
Zone-I	Zero Concentrated	0 to 0	Mathurapur-I & Magrahat-I	2
Zone-II	Low	0 to 1	Mandirbazar & Mathurapur-II	2
Zone-III	Moderate	1 to 15	Magrahat-II & Diamond Harbour-I	2
Zone-IV	High	15 to 20	Falta & Diamond Harbour-II	2
Zone-V	Very High	20 to 45	Kulpi	1

[Source: Classified by the Author]

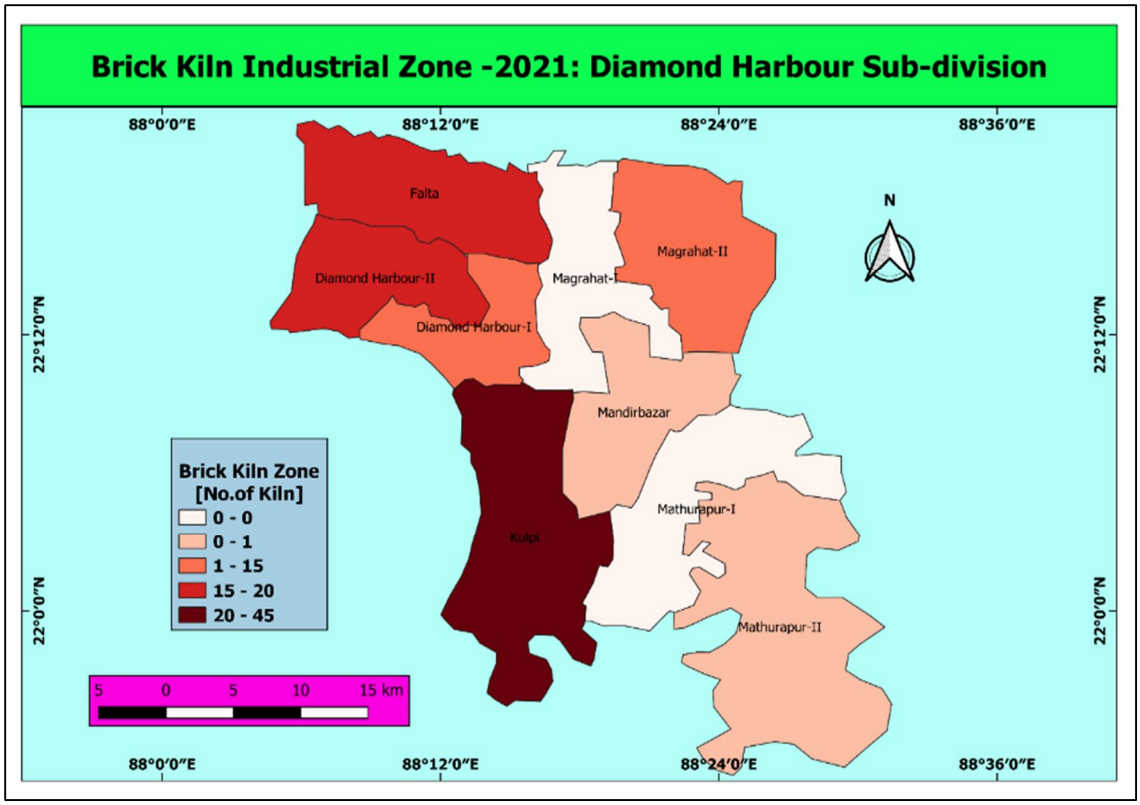


Fig.-10: BKI Zone of Diamond Harbour SD [Map Source: Prepared by the Authors (S. Purakayastha & Dr. A. Sengupta) form QGIS]

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VII. TYPES OF BRICK KILN OR TECHNOLOGY FOR BRICK BURNING

A. *Previous BKI Types and Technology*

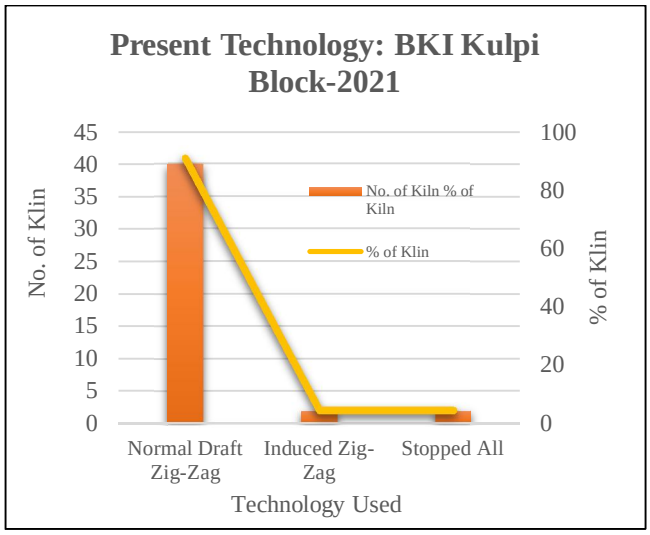
Table: -V: Brick Kiln Types or Technology for Brick Burning.

Brick Kiln Types or Technology for Brick Burning.			
Type of Kiln	Type	Classification	Sub-Classification
Intermittent / Remittent Kiln	1.Without Stack	i. Clamp	N.A.
		ii. Scove	
		iii. Scotch	
	2.With Stock	Down Draught Kiln (DDK)	
Continuous Kiln	1.Moving Fire Kiln	i. Buii"S Trench Kiln (BTK)	a. Moving Chimney Bull"s Trench Kiln
			b. Fixed Chimney Bull"S Trench Kiln (MCBTK)
		ii. Hoffman Kiln (HK)	a. Original Hoffman Kiln (OHK)
			b. Hybrid Hoffman Kiln (HHK)
		iii. Zig Zag Kiln (ZZK) OR Habla Kiln / Habla Zig zag Kiln	a. Natural Draught Zig Zag Kiln (NDZZK)
			b. High Draught Zig Zag Kiln (HDZZK)
	2. Moving Ware Kiln	i. Tunnel Kiln	N.A.
		ii. Vertical Shaft Brick Kiln (VSBP)	

Source: Field Survey by Author.

B. *Present Brick Kiln Technology: Kulpi Block-2021*

Production Technology Used at Present-2021				
Type	Normal Draft Zig-Zag	Induced Zig-Zag	Stopped All	Total
No. of Kiln	40	2	2	44
% of Kiln	90.9	4.55	4.55	100



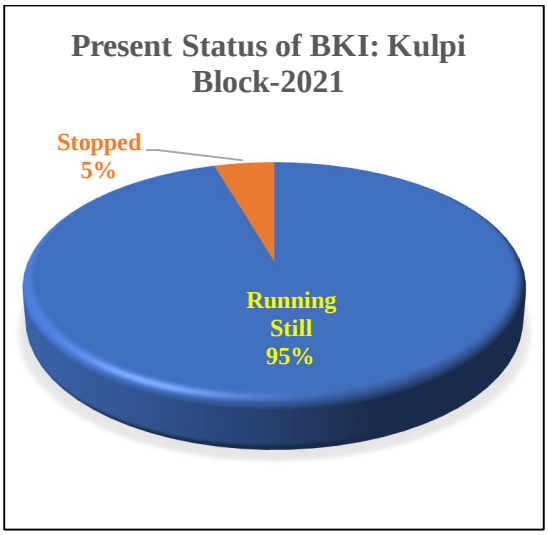


Fig.- 11 (Present Technology-BKI) & Fig.-12 (Present Status-BKI)

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Total Brick Kiln		
Brick Kiln	Running Still	Stopped
No.	42	2
in %	95.45	4.55

VIII. MAJOR FINDINGS

A. Kulpi is the largest block based on number of brick kiln industry in sub division.
B. Near about 50% of BKI of the sub division has concentred in this kulpi block.
C. Kulpi BKI is lying the river side (western part of the block).
D. Kulpi BKI is existing in five village area mainly.
E. The two blocks, Mathurapur-I and Magrahat-I are brick kiln free area as per the government records and field survey of SD.
F. Sub Division has divided into 5 concentration zone of BKI
G. BKI zoning map has prepared for S.D.
H. Total Engagement of Workers in BKI of kulpi block is near 18,000.
I. Near 40 % of Brick Kiln Industrial Workers are Women Workforce (is equal 7200) in kulpi.
J. Most of the economic activity of women workers depends on BKI in this block.
K. The people as well as women workers of BKI carry their livelihood based on this type of unorganized and semi- organized industry in this block.

IX. CONCLUSIONS

Being unskilled and literacy being an impediment for the people of Kulpi, BKI is treated as saviour. Though BKI is an unorganized sector but its economic importance for local people is enormous. Women of the area gets an opportunity to share their contribution and being self-reliant, they held their head high. Employment generation is another front which the local people enjoy. From the zoning map BKI is restricted to certain Blocks of Diamond Harbour Subdivision. Density of population being high, non-availability of proper soil and connectivity for the transportation of the raw material is restricting it to certain Blocks only. Overall, the self-dignity of women and employment generations for the local population highlights the success story behind the BKI. Government should take initiative to develop and promote more such BKI in the rural areas for sustenance for the people below poverty level and raising their self-esteem and last but not the least revenue generation for the state.

Kulpi Brick kiln Industrial area has established its reputation for being the recruitment hub for unorganized sector. People of the area are solely dependent on BKI for their livelihood. In future BKI will raise more opportunity for employment. Women are engaged in this field for financial support to their families and be self-sufficient.

X. ACKNOLEDGEMENT

I will like to thank my Ph.D. supervisor, Dr. Anuradha Sengupta who gave me sufficient amount of knowledge during my research. I convey my special respect and thanks to my goddess, my mother for her affection and blessings. I will specially like to thanks my family and my daughter for their continuous support during this research study.

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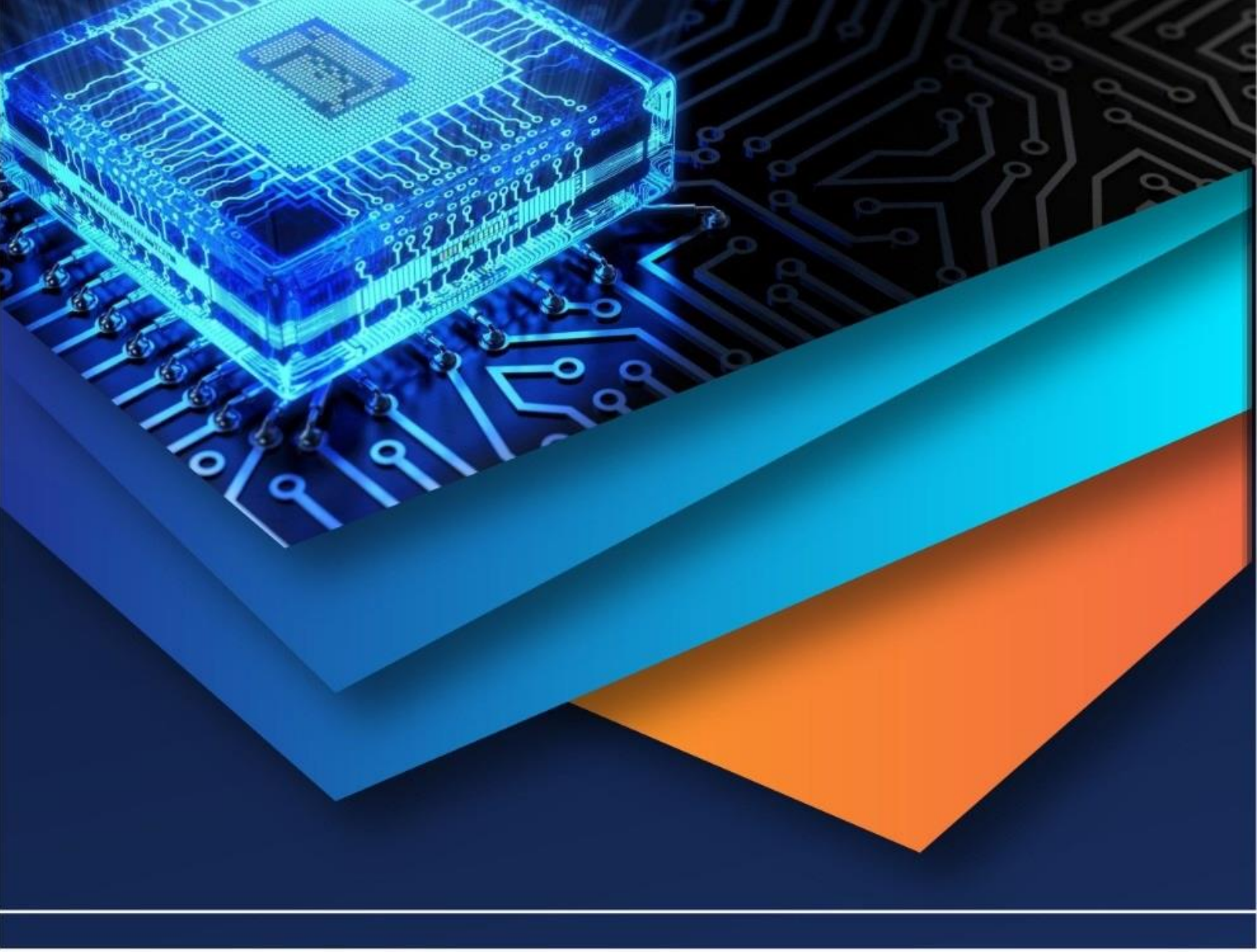
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