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Statistical Analysis of Clay Mining of Bikaner

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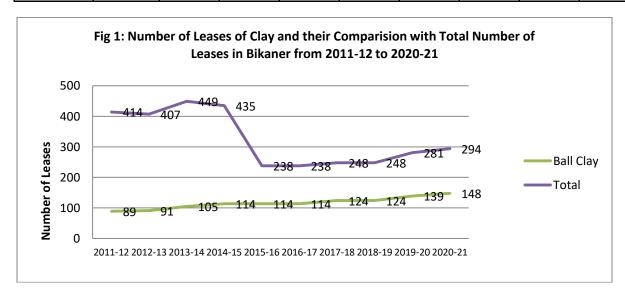
INTRODUCTION

Bikaner is bestowed with huge deposits of non-metallic minerals including Ball clay. Ball clay is the raw material for the ceramic industries. The Bikaner region is well known for their clay minerals. Bikaner contributes about 90% of ball clay in the economy of north-western Rajasthan. All these resources, which generate millions of rupees as revenue for the government's exchequer, have vast employment potential but they are not given their due importance in the development of this region.

CLAY MINERAL RESOURCES IN BIKANER DISTRICT

The Bikaner district alone accounts for more than 90% of Rajasthan's total clay production. There are 148 leases of Ball clay in the year 2020-21 in Bikaner district. Clay deposits are found in following places: Khari Charnan, Guda, Kotri, Mudh, Kolayat, Inda Ka Bala, Madhogarh, Nal, Guda.

Table 1: No.	. of Leases o	of Clay in B	Bikaner (20	11-12 to 20)20-21)					
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-	2020-
Mineral									20	21
Ball Clay	89	91	105	114	114	114	124	124	139	148
Total	414	407	449	435	238	238	248	248	281	294





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		Table	2: Mining	Area of C	lay in Bika	ner (2011-1	2 to 2020-21	1)		
Mineral	2011-12	2012-13	2013-	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-
			14							21
Ball Clay	5009.21	5303.75	5353.75	5353.75	5353.75	5353.75	5353.75	5353.75	4719	5548
Total	14624.45	14913.11	15067.5	14231.2	13983.47	13983.47	13983.47	13983.47	12817.74	13630

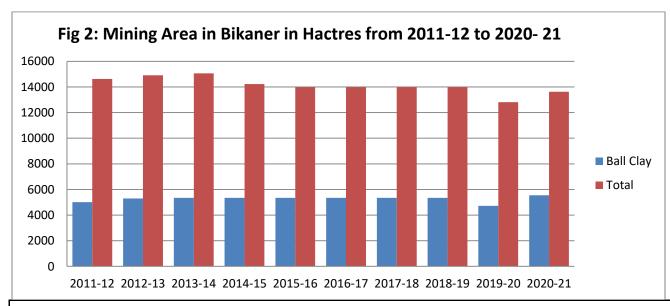


	Table 3: Production of Clay in Bikaner in Thousand Tonnes (2011-12 to 2020-21)									
Mineral	2011-12	2012-13	2013-14	2014-15	2015-16	2016-	2017-18	2018-19	2019-	2020-
						17			20	21
Ball	2116.551	2474.187	3111.317	3118.45	3402.16	3437.28	3677.16	4743.28	3014.1	4094.5
Clay				7	1	8	9	9	06	22
Total	20873.57	18724.29	22226.95	19577.2	16902.8	14649.2	16563.5	10231.7	8511.3	9709.6
	2	7	1	8	18	29	9	62	27	54
										[



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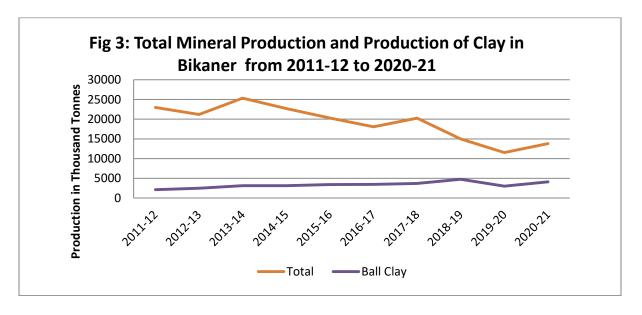


Table 4: Sale	Value of Cla	y in Bikane	r in Lac Rupee	s (2011-12 t	to 2020-2 1)					
Mineral	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Ball Clay	8466.204	13608.03	14934.32160.	17151.51	23815.127	24061.016	25740.183	33203.023	21098.74	28661.65
Total	73589.978	79727.51	71364.92	77752.6	72444.839	71859.618	72079.99	73512.584	59695.98	70006.96

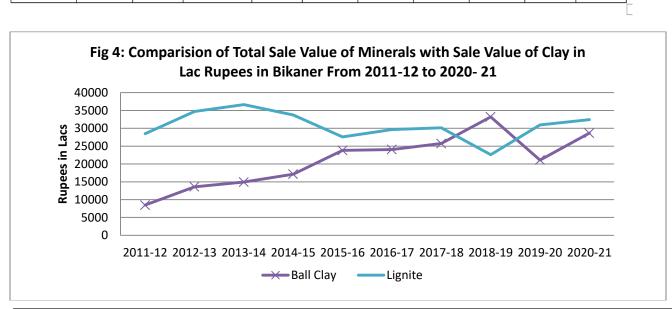


Table 5: F	Revenue from C	ay in Bikane	er in Thousa	nd Rupees	(2011-12 to	2020-21)				
Minera	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Ball Cla	y 53522.775	85222.83	124540.2	140544.2	206079.29	222268.81	212140.72	273216.06	334366.6	295695.2
Total	569028.9	748326.4	743980.3	800987.7	741553.38	794173.7	975052.85	956734.85	1087100	725814.5



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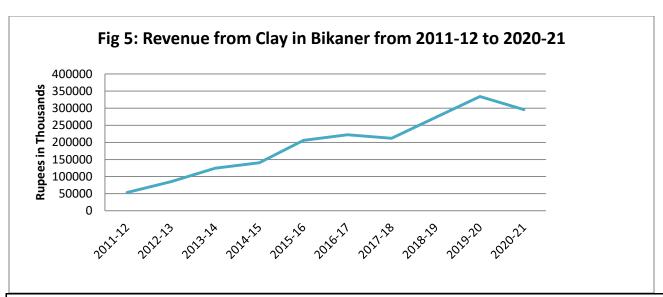
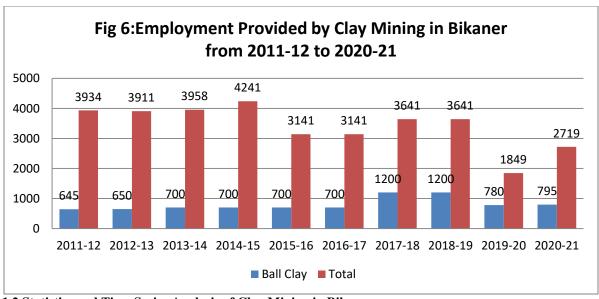


Table:6: Empl	oyment pr	ovided by	Clay Min	ing in Bik	aner (2011-	12 to 2020	-21)			
Mineral	2011-	2012-	2013-	2014-	2015-16	2016-17	2017-	2018-	2019-	2020-
	12	13	14	15			18	19	20	21
Ball Clay	645	650	700	700	700	700	1200	1200	780	795
Total	3934	3911	3958	4241	3141	3141	3641	3641	1849	2719



1.2 Statistics and Time Series Analysis of Clay Mining in Bikaner

The Table 1 to Table 6 and Figure 1 to Figure 6show the Number of leases, Mining area, Production, Revenue, Sale Value and Employment in Bikaner in Mineral Sectorand their comparisons with Clay.

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These Tables and Figures clearly indicate that Ball clay is the chief contributor in the above mentioned parameters in Bikaner from 2011-12 to 2020-21. The Ball Clay shifted to Minor mineral category from the year 2015-16. Data presented in Table 1 to Table 6show that ball clay is dominant among minerals produced in Bikaner which contribute significantly in government's revenue.Ball clay and Gypsumcontributed. 63.8% of the total revenue earned by the government from various minerals.

Data of last 10 years of ball clay production proves its vitality in Bikaner. The maximum clay production comes from Bikaner. From the mineral point of view Bikaner district can be called the clay district. Out of 294 mining leases in this district in the year 2020-21,148 are for ball clay (Table 1). Mining leases of Ball clay has been shown rising trend. Number of leases in the year 2011-12 was 89 which are 148 in the year 2020-21. Total mining area of Ball clay is increases from5009.21 hectare in 2011-12 which is5548 hectare in 2020-21(Table 2.). Ball clay and gypsum constituted about 71.04 % of the mining area of Bikaner in the year 2011-12 which increases up to 76.10% in the year 2021-22. This increase in mining areas and mining leases of ball clay also reflects in production too. In 2011-12, the percentage contribution of ball clay was 10.14 % (2116.551 thousand tonnes) of the total mineral production of Bikaner(Table 3 & Fig 4). This contribution in the year 2018-19 was recorded 46.36% and 42.17% in the year 2021-22. In the year 2019-20 the production is 35.41% (3014.106 thousand tonnes). (it is the impact of Lockdown due to COVID).

However, the sale value increased more than 3 times, 8466.204lac rupees (11.5% of total sale value) in the year 2011-12 to 28661.65lac rupees in the year 2020-21 that is 40.94% of the total sale value of minerals in Bikaner. The maximum sale value was recorded in the year 2018-19, which were 33203.023lac rupees. (Table 4 and Fig 6). The share of Sale Value of Ball Clay in the year 2020-21 is 40.94%.

Revenue increases 550 % in the last 10 years from 53522.775 thousand rupees in the year 2011-12 (9.4% of total revenue) to 295695.2 thousand rupees in the year 2020-21(40.74% of the total revenue). The trend of revenue of Ball clay was in general increasing but shows decline in the year 2013-14 and 2019-20 (Table 5 & Fig 8).

1.3 Time Series Analysis of Production, Sale Value and Revenue of Clay Mining in Bikaner

On the basis of these data regarding minerals of Bikaner, a Time Series Analysis related with Production(Table3) Revenue (Table 4) and Sale value (Table 5) of Ball clay, has been done. Their trend values are calculated by adopting OLS technique. The results are depicted in the following table (Table 7):

Trend equation: Y = a+bt

Where,

a = intercept

b = coefficient of trends

t = time

Significance of coefficient is indicated by 't' value as * at 5 % level.

Table 7presents the results of least square trend equations of time series data of ten years regarding production, revenue and sale value of their concerning minerals-Gypsum, Ball clay, kankar- bajari, limestone and brick earth. 't' values are marked by *, at 5% level of significance.

Table 7: Results of Bikaner.	f Time Series Analysis of Pro	oduction, Revenue and Sale V	alue of Ball Clay Mining in
Minerals	Trend equation of Production	Trend equation of Revenue	Trend equation of Sale Value
Ball clay 't' value	3318.9047+190.6182t .278	194859.6811+290702.5333t 3.275*	21073.8126+2310.6207t2. 014*
*, significant at 5%	level of significance.		

Under mineralproduction, ball clay is the principal minerals found in Bikaner, and shows a high growth rate in production which is depicted by their positive value of production coefficient. The rise in production in Ball Clay is not much significant. Least square trend in revenue from clayhave positive coefficient indicating the



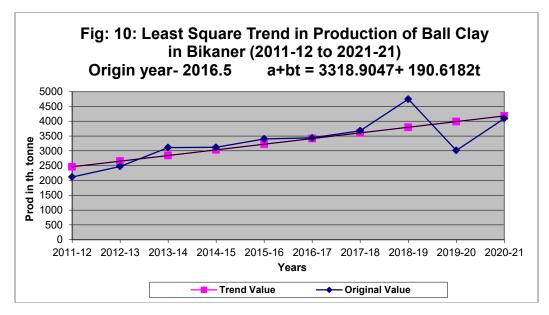
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rising trend over the time period of ten years. As far as sale value is concerned, there is a significant rise in sale value of Ball clay.

On the basis of these estimated least square equations (Table 7) trend values are calculated of and presented in Table 8 to Table 10 and their respective graphical presentation are depicted in Fig. 10 to Fig 12.

Table 8: Least 2020-21	able 8: Least Square Trend Values in Production of Ball Clay in Bikaner from 2011-12 to $Y = 3318.9047+190.6182t$					
Years	Production in Thousand Tonnes	a+bt = Yc				
2011-12	2116.551	2461.11				
2012-13	2474.187	2651.73				
2013-14	3111.317	2842.35				
2014-15	3118.457	3032.97				
2015-16	3402.161	3223.59				
2016-17	3437.288	3414.21				
2017-18	3677.169	3604.83				
2018-19	4743.289	3795.45				
2019-20	3014.106	3986.07				
2020-21	4094.522	4176.69				



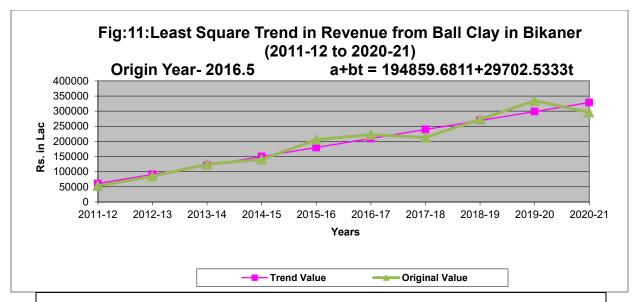
_	ble 9:Least Square Trend Values in Revenue of Ball Clay in Bikaner from 2011-12 to 21-22Y = 194859.6811+290702.5333t					
Years	Revenue in Lac Rs.	a+bt = Yc				
2011-12	53523	61198.28125				
2012-13	85222.825	90900.81455				
2013-14	124540	120603.3479				
2014-15	140544	150305.8812				
2015-16	206079	180008.4145				



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2016-17	222269	209710.9478
2017-18	213140.722	239413.4811
2018-19	273216.06	269116.0144
2019-20	334366.618	298818.5477
2020-21	295695	328521.081

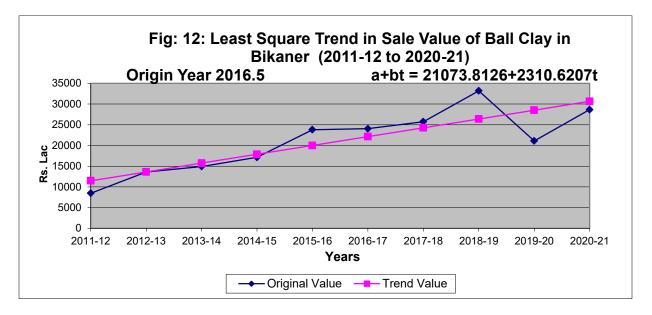


Y = 21073.8126+2310.6207t					
Years	Sale Value	a+bt = Yc			
2011-12	8466	11486.26905			
2012-13	13608.0285	13616.87175			
2013-14	14934	15747.47445			
2014-15	17152	17878.07715			
2015-16	23815.127	20008.67985			
2016-17	24061.016	22139.28255			
2017-18	25740.183	24269.88525			
2018-19	33203.023	26400.48795			
2019-20	21098.742	28531.09065			
2020-21	28661.654	30661.69335			



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From Table 8 to Table 10 least square trend in ball clay of Bikaner is estimated. The estimated least square trend in production of ball clay are rising. Ball clay production has an annual decreasing rate 2310.6207 tonnes (Table 8 and Figure 10). Ball Clay is the highest revenue earner for the government contributing at the rate of 2310.6207 thousand rupees annually (Table 9and Figure 11) The sale value has also shown a rising trend.

In brief the results of least square trend values reveal some important aspects regarding Clay in

• In spite of ball clay being the highest revenue earner for the government, the estimated least square trend in revenue from ball clay resulted in an insignificant value.

The factors responsible for the above mentioned results can be highlighted as:

- 1. There is an unsystematic and un-organized mining of ball clay in Bikaner. With a shortage of labour availability in mining areas and upsurge trend in labour wages the mine owners are unable to coordinate the demand and supply of ball clays, secondly, the mine owners are unable to compensate this labour shortage through incorporation of automatic mining due to small mining lease area.
- 2. Lack of proper marketing of mining product according to the demand of buyers. Grading of clay according to its uses was not proper in Bikaner because of the lack of Ceramic testing laboratory in the years of study. Recently the ceramic testing facility has been developed in Bikaner.
- 3. Clay mining, although, is facing the problem of water shortage for setting up improved mining system which utilizes water (wet mining) but the other systems for automatic production in clay mining can be modified to suit the mining environment in Bikaner.
- 4. Lack of development of ceramic industries in Bikaner because of unavailability of power, entrepreneurship and ceramic education.
- 5. Along with the mechanisation and technological development for higher production in ceramic industries, the demand for ball clay with quality consistency is increasing at faster rate. But there is a dearth of testing and beneficiation facilities at mine sites which are the vital factor to sustain the demand for ball clay.
- 6. Local ceramic industries could not compete with Indian ceramic industries as their products were inferior in quality.

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REFERENCES

- 1. DMG, Rajasthan, Mineral Statistics year 2011 to 2021
- 2. Nathuramka L.N., (2009): Economy of Rajasthan, CBH, Jaipur, pp.64-69.
- 3. Sinha, R.K. and Sharma, N.L. (1988): Mineral Economics (4th edition) Pub. Oxford IBH Publishing Co. Pvt.Ltd.-New Delhi, pp. 305-310.
- 4. Chatterjee, K.K. (1991): An Introduction to Indian Mineral Economics, Prentice Hall, Kolkatta, pp. 324-325
- 5. Somra S.S.(2008): "Industrial development in Rajasthan: An econometric analysis." Article in Rajasthan Economic Journal, volume 32, pp.243-246.













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