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A Synoptic view on Production, Sale value and Revenue of Mineral in North-West Rajasthan

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INTRODUCTION

The region covered by the North-western Rajasthan is characterized by the Great Indian desert of Thar. The area characterizes for the harsh conditions. However, nature has been generous in compensating for these adversities by bestowing with a variety of mineral resources The region comprises huge deposits of non-metallic minerals like clay, gypsum, limestone, fuller's earth, sandstone, etc and energy resources like lignite, natural gas and petroleum. The area has basic raw materials in the form of minerals for ceramic wares, chemical and fertilizers, glassware, fire proof and cement and steel plants. Fig.1 gives an overview about the location of North-West regions and major and minor minerals occurring in the region.

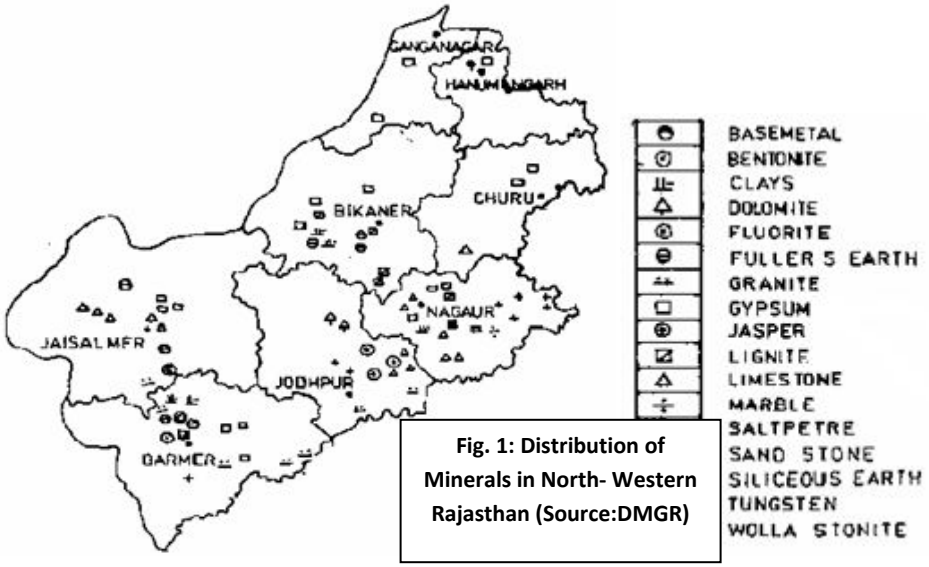

Fig. 1: Distribution of Minerals in North- Western Rajasthan (Source:DMGR)

The Table 1 represents various aspects of mineral resources of North-western Rajasthan regarding production, sale value, revenue and mining leases from 1998-99 to 2012-13.

The statistics regarding mineral production, sale value, revenue and mining leases in Table 1 shows a lucid picture of mineral resources in North-West Rajasthan. Production of minerals show an increasing trend till 2012-

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13(Table 1C) except the year 2005-06, but number of mining leases has not shown any progress. The number of leases was 3773 in 1998-99 which reduced to 2896 during 2012-13(Table 1A). This reducing number of mining leases is responsible for the reduction in production of minerals in northwestern Rajasthan. After 2004-05 (52571.78 thousand tonnes) the total mineral production suffered a sharp dip (36635.03 thousand tonnes during 2005-06) and again taken the rising trend 73441682 thousand tonnes in 2012-13 (Table 1C). But production of minor minerals has resulted better than the production in major minerals with the increase in number of leases. The production of major minerals has fluctuating trend with fluctuating trend in the number of mining leases (Table 1C).

Mineral market has achieved a good rise in the sale value. The total sale value has shown a tremendous boost except in the year 2005-06 (Table 1D).

Sale value of major minerals has increased by more than four times where as this increase many times in minor minerals (13639.28 lac rupees in 1998-99 to 215304 lac rupees in 2012-13). However, at the same time the production of minerals has risen by less than two times in case of both minor as well as major mineral production (Table 1C).

During the study period of 15 years there has been a commendable rise in revenue earned from royalty. Revenue enhanced more than six times. During 1998-99 the total revenue earned by the government was 286833.32 thousand rupees which skipped to 1844764.01thousand rupees during 2007-08 and 3539565 thousand rupees during 2012-13 (Table 1E). Great jump in revenue from minor minerals has been achieved with more than nine times. The revenue from minor minerals was 115627.32 thousand rupees during 1998-99 and it blasted to 2341469 thousand rupees in 2012-13 where as this rise was only more than four times in major minerals in North-Western Rajasthan (Table 1E).For employment the statistics have not been encouraging total employment is 99058 persons in the year is 92905 persons in the year 2012-13.

Table 1: Mineral Statistics of North- Western Rajasthan (1998-1999 to 2012-2013)

Year	(A)Leases			(B)Area (in Hectare)			(C)Production ('000 Tons)		
	Major	Minor	Total	Major	Minor	Total	Major	Minor	Total
1998-99	198	3575	3773	33852.26	24563.76	58416.02	14379.44	26763.48	41142.92
1999-2000	214	3874	4088	36582.78	27265.19	63847.97	19615.52	28925.22	48540.74
2000-01	230	4128	4358	42830.43	33734.26	76564.69	22321.32	33234.45	55555.77
2001-02	235	4231	4466	41670.17	32546.83	74217.00	25561.55	38788.58	64350.14
2002-03	241	4230	4471	46890.88	26872.89	73763.77	23383.29	40475.54	63858.83
2003-04	228	3961	4189	43559.14	20350.50	63909.64	23745.56	42763.06	66508.62
2004-05	227	3912	4139	39213.28	18405.12	57618.40	15101.94	37469.84	52571.78
2005-06	156	1730	1886	30022.82	16027.02	46049.84	5749.01	30886.01	36635.03
2006-07	219	1910	2129	35134.12	16436.92	51571.04	13126.47	57458.53	70585.00
2007-08	233	2157	2390	34668.1	15923.9	50592.0	16129	47582.6	63711.6

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2008-09	215	2100	2315	29237.91	11570.16	40808.07	9332359	52180700	61513059
2009-10	222	2251	2473	28969.41	11985.37	40954.78	9783828	50350345	60134173
2010-11	237	2414	2651	34781.12	12234.43	47015.55	11887477	55039970	66927447
2011-12	253	2627	2880	35588.87	11444.72	47033.59	13074325	56964959	70039284
2012-13	276	2620	2896	35825.87	11418	47243.87	16277321	57164361	73441682
Year	**(D)Sale Value (Rs. In Lacs)**			**(E)Revenue (Rs. In Thousands)**			**(F)Employment (Nos.)**		
	Major	**Minor**	**Total**	**Major**	**Minor**	**Total**	**Major**	**Minor**	**Total**
1998-99	9846.77	13639.28	23486.05	171206.00	115627.32	286833.32	6848	92210	99058
1999-2000	10367.87	15374.35	25742.22	179068.69	137573.46	316642.15	7214	98572	105786
2000-01	11354.49	17694.62	29049.11	190327.46	165438.96	355766.42	8735	105272	114007
2001-02	17659.69	22475.04	40134.73	210440.25	202839.04	413279.29	9879	115272	125151
2002-03	22372.05	28161.14	50533.19	238168.29	216286.77	454455.06	13708	116205	129913
2003-04	27402.93	34988.92	62391.85	275508.03	241931.66	517439.69	13267	105652	118919
2004-05	28993.56	42236.03	71229.59	341205.05	363856.32	705061.37	10292	116986	127278
2005-06	16881.07	50074.16	66955.23	357817.34	826051.78	1183869.12	4996	139165	144161
2006-07	29996.80	60577.38	90574.18	687396.23	867048.48	1554444.70	4436	77833	82269
2007-08	45952.244	94599.44	140551.69	751575.582	1093188.43	1844764.01	6507	75202	81709
2008-09	34781	142566.2	177347.2	622629.3	1870106	2492735	6208	75988	82196
2009-10	41754.9	151117.7	192872.6	646296.7	1336335	1982632	3069	78384	81453
2010-11	525514.7	173520.5	699035.2	740019.8	1419172	2159192	3229	81516	84745
2011-12	853990.9	198913.9	1052905	655922.2	1710254	2366176	3213	84743	87956
2012-13	1111784	215304.2	1327088	1198086	2341479	3539565	3242	89663	92905
Source: DMG Rajasthan									

Time Series Analysis of Production, Sale Value and Revenue North-West Rajasthan

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The above discussed facts are analyzed by Time series analysis using ordinary least square (OLS) technique in the Table 2:

Least square equation: **Y = a + bt**, Where

Y = Trend value in production/revenue/sale value of major and minor minerals.
a = intercept
b = slope of the trend line/rate of change
t = time (no. of years)
Significance of coefficient is indicated by 't' value as * at 5 % level.

Table 2: Results of Least Square Trend equation in Production/Revenue/Sale value of Major and Minor Minerals in North-West Rajasthan.

Particulars	Least square equation **(Production)** Y= a+bt	Least square equation **(Revenue)** Y= a+bt	Least square equation **(Sale value)** Y= a+bt
Major minerals 't' value	**52177.75+9535.75t** (-1.344)	**484377.8+60688.85t** (5.144)*	**546492.3+5499.1t** (4.685)*
Minor minerals 't' value	**43736.51+2146.65t** (3.079)*	**860479.21+153524.5t** (5.784)*	**84082.86+15312.03t** (6.879)*
*, significant at 5% level of significance			

Table 2depicts the least square trend equations in production, revenue and sale value of major and minor minerals in north-western Rajasthan. Except the major mineral production all the values described in Table 2reveals statistically significant values at 5% level regarding production of minor minerals, revenue (major and minor minerals) and sale value (major and minor minerals) respectively. On the basis of these estimated least square equations the trend values are calculated of production, revenue and sale value of major and minor minerals in Table 3, Table 4 and Table 5.and graphical presentation of these estimated trend values are depicted in Fig. 2, Fig 3 and Fig 4 respectively.

Table 3: Estimated Least Square Trend Values of Production in Major Minerals (Y=52177.75+9535.75t) and Minor Minerals (43736.51+2146.65t) of North-west Rajasthan.

Year	Production Major	a+bt=yc	Production Minor	a+bt=yc
1998-99	14379.44	24001.53	26763.48	22581.02
1999-2000	19615.52	23131.50	28925.22	24845.84
2000-01	22321.32	22261.47	33234.45	27110.66
2001-02	25561.55	21391.43	38788.58	29375.47
2002-03	23383.29	20521.40	40475.54	31640.29
2003-04	23745.56	19651.37	42763.06	33905.10
2004-05	15101.94	18781.33	37469.84	36169.92
2005-06	5749.01	17911.30	30886.01	38434.74
2006-07	13126.47	17041.27	57458.53	40699.55
2007-08	16128.992	16171.23	47582.64	42964.37
2008-09	93323.59	15301.20	52180.7	45229.18
2009-10	97838.28	14431.17	50350.35	47494.00
2010-11	118874.77	13561.13	55039.97	49758.82
2011-12	130743.25	12691.10	56964.96	52023.63
2012-13	162773.21	11821.07	57164.36	54288.45

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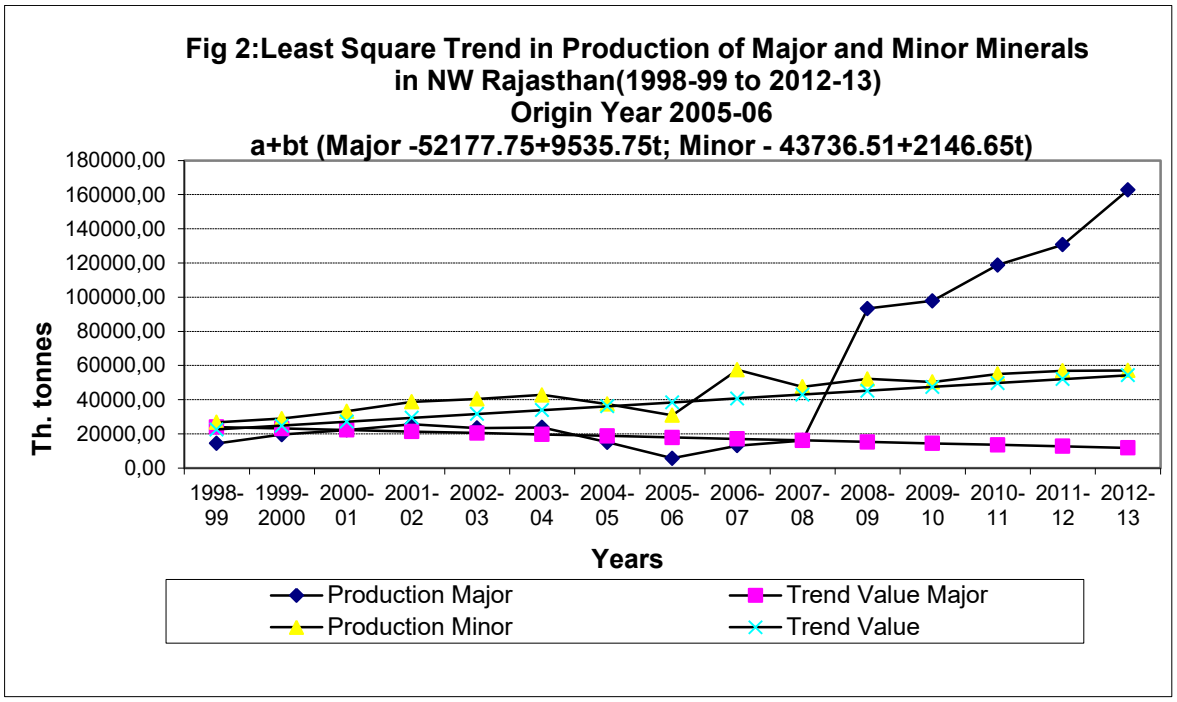

Table 4: Estimated Least Square Trend Values of Revenue in Major (484377.8+60688.85t) and Minor Minerals (860479.21+153524.5t) in North-west Rajasthan.(Rs. in Thousands)

Year	Revenue Major	a+bt=yc	Revenue Minor	a+bt=yc
1998-99	171206.00	-86037.30	115627.32	-328609.42
1999-2000	179068.69	-25136.07	137573.46	-221238.90
2000-01	190327.46	35765.15	165438.96	-113868.38
2001-02	210440.25	96666.38	202839.04	-6497.86
2002-03	238168.29	157567.61	216286.77	100872.66
2003-04	275508.03	218468.84	241931.66	208243.18
2004-05	341205.05	279370.06	363856.32	315613.70
2005-06	357817.34	340271.29	826051.78	422984.22
2006-07	687396.23	401172.52	867048.48	530354.74
2007-08	751575.582	462073.75	1093188	637725.26
2008-09	622629.3	522974.97	1870106	745095.78
2009-10	646296.7	583876.20	1336335	852466.30
2010-11	740019.8	644777.43	1419172	959836.82
2011-12	655922.2	705678.65	1710254	1067207.34
2012-13	1198086	766579.88	2341479	1174577.86

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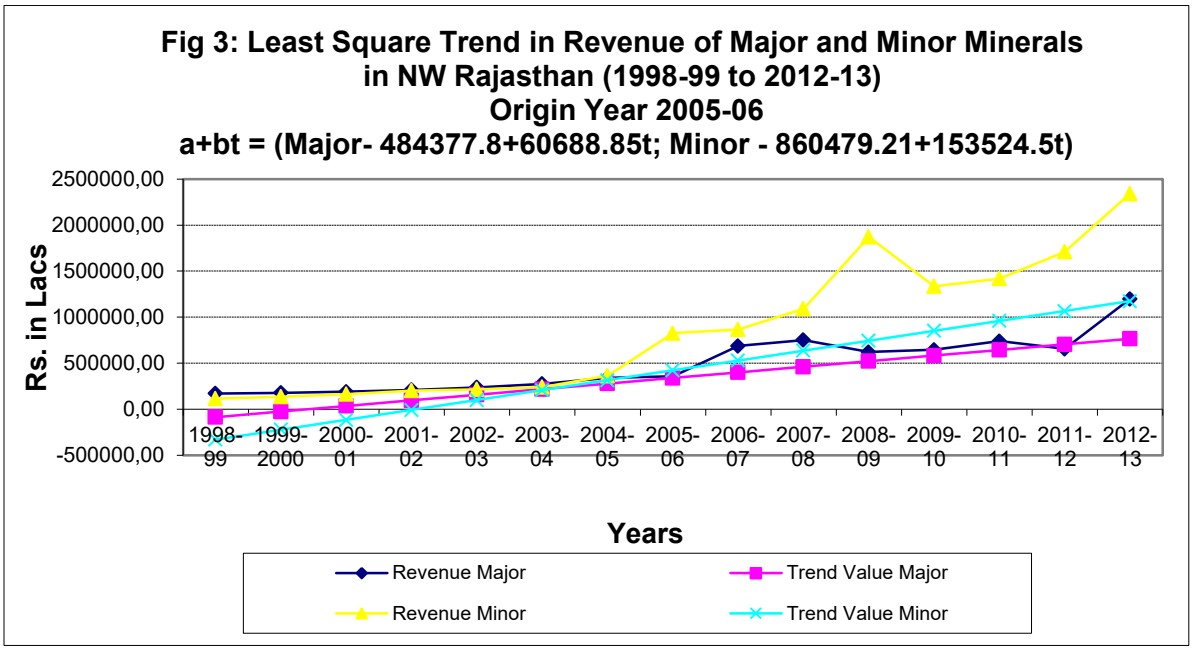

Table 5: Estimated Least Square Trend Values of Sale Value in Major Mineral (546492.3+5499.1t) and Minor Mineral (84082.86+15312.03t) in North-west Rajasthan.(Rs. in Lacs)

Year	Sale Value (Major	a+bt=yc	Sale Value (Minor	a+bt=yc
1998-99	9846.77	-360.41	13639.28	-16027.04
1999-2000	10367.87	2845.76	15374.35	-8311.46
2000-01	11354.49	6051.92	17694.62	-595.88
2001-02	17659.69	9258.09	22475.04	7119.71
2002-03	22372.05	12464.25	28161.14	14835.29
2003-04	27402.93	15670.42	34988.92	22550.87
2004-05	28993.56	18876.58	42236.03	30266.45
2005-06	16881.07	22082.75	50074.16	37982.04
2006-07	29996.80	25288.91	60577.38	45697.62
2007-08	45952.244	28495.08	94599.44	53413.20
2008-09	34781	31701.24	142566.2	61128.78
2009-10	41754.9	34907.41	151117.7	68844.37
2010-11	52551.47	38113.57	173520.5	76559.95
2011-12	85399.09	41319.74	198913.9	84275.53
2012-13	111178.4	44525.90	215304.2	91991.11

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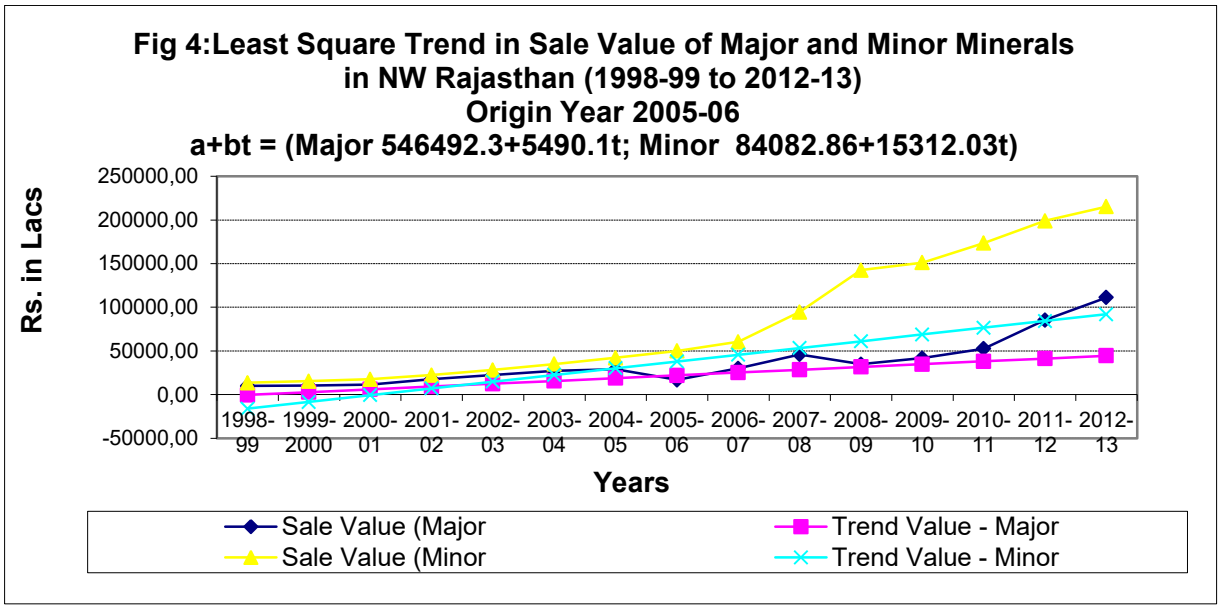

Table 3, Table 4 and Table 5 depict the estimated least square trends in production, revenue and sale value of major and minor minerals respectively of North-Western Rajasthan. The trend value in production of major minerals is declining at a rate of 870.03 thousand tonnes per annum during the period under consideration while the minor minerals has seen a rising trend of 2264.82 thousand tonnes annually (Table 3 and Figure 2). In spite of declining trend in production, the revenue and sale value trends are showing an increasing trend in major and minor minerals (Table 4 and Figure 3& Table 5 and Figure 4 respectively). The mineral market has achieved a good uptrend in sale value. This is indicated by sharp rise in trend value of minor minerals having the annual rate of increase 7715.58 lac rupees than major minerals. The sale value of major minerals enhanced at the rate of 3206.165 lac rupees annually (Table 5 and Figure 4). This is because of the changing aptitude of leasee, they became cost conscious and prefer to mine economically. With the rising trend in sale value, a commendable upward trend was also observed in revenue of major and minor minerals of North-Western Rajasthan (Table 4). In this region the minor minerals are also doing better than major minerals. The revenue from minor minerals has increased at the rate of 107370.52 thousand rupees annually during the last 10 years while the rate of increase in revenue from major minerals has been slower i.e. 60901.23 thousand rupees annually (Table 4 and Figure 3).

Factors responsible for the declining trend in production in major minerals in North-West Rajasthan:

- Generally major minerals include industrial minerals like lignite, oil &gas, gypsum, limestone (SMS grade), and ball clay. The industries based on these industrial minerals are not developed locally. So the production of major minerals faces a shortage of local demand.
- These minerals also face the problem of poor infrastructure facility as it needs a highly developed infrastructure for the project.
- Due to high transportation cost, movement of these minerals becomes costlier to other parts of the region.
- Increasing practice of Illegal mining of gypsum due to strict policy of the government
- Lack of value addition facilities, the use of mineral becomes limited locally, as they are being sent to other states in raw form.
- Increasing use of substitute also responsible for the reduction in demand of the affected minerals

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- Lack of R&D programs and training and development of minerals at local level
- The mining industry of major minerals in north-west Rajasthan suffers from an out-dated, unattractive approach to mining education that is partly to blame for insufficient human resources.
- Mining licenses, quarry licenses and seeking permission to establish mineral based industry, face the pressure of bureaucratic control.

Factors responsible for the rising trend in minor minerals in North-West Rajasthan:

- Under minor minerals generally the construction minerals like brick earth, limestone (burning/building), kankar-bajari, sand stone, marble and granite etc. are included which have sufficient local demand
- It does not require high skills
- Marble, sand stone and granite are the principle minerals among minor minerals which are being used widely in Hotels, multistoried buildings, shopping complexes, residential flats etc. Therefore, the demand for these stones is increasing day by day not only at local level but also in other states.
- It also does not require heavy investments.
- Less labour force is required.

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