International Journal of Environmental Engineering – IJEE
Volume 1: Issue 2 *[ISSN 2374-1724]*
Publication Date : 25 June 2014

Investigating the presence of resource curse hypothesis in mining sector of India

Auro Kumar Sahoo
Naresh Chandra Sahu

Abstract—This paper tries to explore the presence of resource curse hypothesis in 11 mineral rich states of India. To carry out the empirical investigation, cross correlation has been estimated between quality of life indicators and mineral production in 11 major mining states of India. The present study is completely based upon secondary sources of data which are extracted from different sources of Government of India. To find out the relationship between quality of life indicators with mining activities, we have taken into account the quality of life indicators such as, educational attainment, life expectancy, tele-density and electrified villages of mining states. In addition, socio-economic indicators such as, per capita income, unemployment rate, poverty ratio and mining employment are used to unravel the relationship between mining activities and development. Cross tabulation of correlation has been adopted for the analysis of data. The result of the present investigation reveals that there is a presence of resource curse in India's mineral rich states.

Keywords— Resource Curse Hypothesis; Mining Activity; Quality of Life Indicators; Socio economic Indicators; Indian States; Cross Correlation.

I. Introduction

Over the year, there has been debate on the relationship between mining extraction and socio-economic wellbeing of a nation. While one group of scholar argues that mineral abundance and its extraction helpful for the development of a country, other group of scholar observed a negative relationship between the resource abundance and socio-economic wellbeing, which supports the presence of resource curse hypothesis.

The relationship between resource abundance and socio-economic wellbeing has attracted attention of researchers for last couple of decades. Natural resource extraction and its proper utilisation contribute to the economic growth process of a nation. In addition to economic growth and good quality of living, socio economic development is necessary for a healthy and sustainable society. It is a generalised fact that extraction of mineral resource generates huge value in the economy and contributes to the Gross Domestic Product (GDP). In some of the studies, it is empirically found that abundance of mineral resources help positively to the economic growth through promoting industrialisation(Weber-Fahr,2002; Brunnschweiler, 2008; Domenech, 2008). On the contrary to the generalised views, it is also evident that there is a presence of negative relationship between resource abundance and economic wellbeing (Auty, 1993; Sachs and Warner, 1999).

In this paper, we have investigated the presence of resource curse hypothesis in mineral rich states of India. In addition, a comparison of socio economic wellbeing and quality of life indicators to the mineral productions have been made for 11 major mining rich states of India where more than 93 percent of mining area are concentrated. India is a leading contributor to the world production of chromites, coal and lignite, Iron ore and manganese (IMY, 2011). This study aims to provide a new insight for the mineral dependent developing countries where Government policies are directed and designed towards the resource induced development strategy.

This paper begins with a brief discussion on the resource curse literature in section II followed by the mining and mineral policies of India in section III. The methodology adopted for the study is presented in section IV and result and discussion are made in section V of the paper. Finally, we have concluded the paper in section VI with the findings from the present research.

Auro Kumar Sahoo
Indian Institute of Technology, Bhubaneswar
India

Naresh Chandra Sahu
Indian Institute of Technology, Bhubaneswar
India

II. Overview of Resource Curse Hypothesis

In the international development literature, resource curse holds a significant place among the scholars with large ongoing debates. The resource curse concept was introduced by Auty in his inter-country analysis of the performance of mineral rich countries in the year 1993. Resource curse hypothesis states that country endowed with huge natural resources tend to have low economic growth and social wellbeing. In the last couple of decades a large number of studies have been carried out for the empirical verification of resource course hypothesis in different countries. Many of the studies support the existence of resource curse in resource rich countries (Auty, 1993; Sachs and Warner, 1997; Gylfason et al., 1999; Sachs and Warner, 2001).

Although the existence of negative relations has been verified by many researchers, we intend to focus upon the exogenous factors which work for the existence of this relation. In relation to the resource curse, the role of institutions and policy are also important. It is not the resource abundance but the policy towards the proper management of resource revenue that helps in achievement of growth (Atkinson and Hamilton, 2003). 'Point resource' and 'diffuse resource' have different impact towards the institutional structure. Point resource is more often concentred on a particular geographical area, as a result of which it generates inequality among communities (Bulte et al., 2005).

In many of the research works, the focus is on the inequality, poverty and institutional issues associated with resource abundance. Mining resources have enhanced the economic growth in some countries (Weber-Fahr, 2002). But the distribution of economic growth through social wellbeing and prosperity has been unequal (Bush, 2008). It is also found that countries with abundant natural resources have low human development index (Bulte et al., 2005) and their performance in terms of per capita income, GDP and saving are not satisfactory (Auty, 1993; Sachs and Warner, 1999).

Although many studies have been undertaken at the country level, the regional study in this respect is not large in number. The first attempt by Papyrakis and Gerlagh(2007) focused on the states of United states and found that natural resource abundance is negatively associated with income growth, which adversely affect the investment, schooling, openness, research and development (R & D) and exacerbate corruption activities. Similarly Hajkowicz et al.(2011) studied on the mining extraction in the regional economy of Australia and related the mining activities with the quality of life indicators. The findings of their investigation do not support the resource curse rather found an improvement in quality of life in the region.

In the above, we discussed the attempts made by different scholars in relation to the validation of resource curse hypothesis. Developing countries are more concerned on the economic growth and are largely dependent upon the natural resources. Testing resource curse hypothesis in disaggregate level will add more value to the ongoing research and debate, particularly in developing countries like India.

III. Indian Mineral Sector at a Glance

India is endowed with huge natural resources. Mining resource is one of the important segments of the Indian economy. The mining sector consists of many metallic and non-metallic minerals. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. India produces as many as 87 minerals. The number of mines which reported mineral production in India was 2076 in 2011-12. The major mining states are: Odisha, Andhra Pradesh, Gujarat, Rajasthan, Madhya Pradesh, Karnataka, Tamil Nadu, Jharkhand, Chhattisgarh, Maharashtra and Goa. It can be located in the mineral map of India given below (Fig.1). In the year 2011-12, these 11 states together accounted for 93.64% of total number of mines in the country.

In the year 2009-10, the mineral production index for all minerals (excluding atomic) stood at 194.38 points. The total value of mineral production (including minor minerals but excluding atomic minerals) showed an increase in about 8%. The value distribution of mineral production showed that fuels accounted for about 70%, metallic minerals about 17%, non-metallic minerals about 2% and minor minerals accounted more than 10%.

Source:www.cseindia.org

Figure 1: Mineral map of India and selected mining states for the present study

In the year 2009-10, the average daily employment in mining sector was estimated at 5,21,425 persons (IMY, 2011). The public sector accounted for 4,19,925 persons (81%) and the remaining 1,01,500 persons (19%) accounted in the private sector (IMY, 2011). The trend of total value of mineral production and mining employment in India can be located in Figure 2.

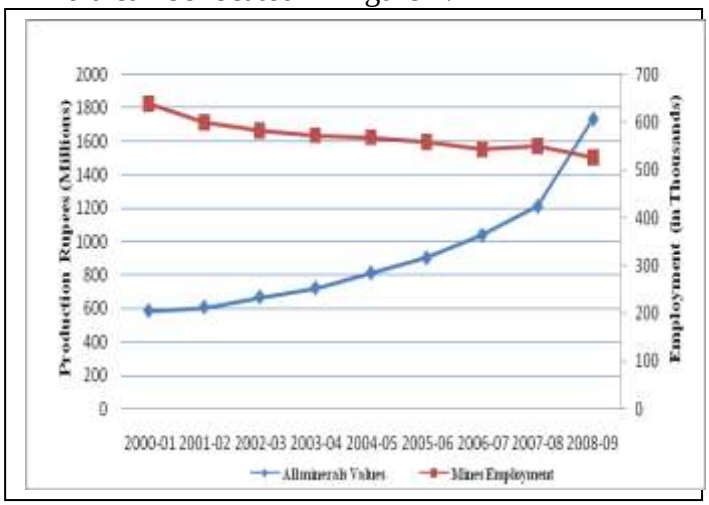

Figure 2: Trend of Value of Mineral Production and Employment

Due to unavailability of data we have presented the total value and employment figure from the year 2000-01 to 2008-09. It reveals a constant increasing trend of total value of mineral production in India whereas a reverse case can be seen in the mining employment. Although mining value is improving the employment generation related to mining activity is falling.

India's ranking in 2009 in world production was second in barytes, chromite and talc/ steatite/pyrophyllite, third in coal and lignite, and steel (crude), fourth in iron ore and kyanite/ sillimanite, fifth in manganese ore and zinc, sixth in bauxite, seventh in aluminium and eighth in refined copper. In the same year, production of minerals covered under Mineral Conservation and Development Rules (MCDR), 1988 was reported from 20 States. Mining and Quarrying sector contribute to GDP through minerals covered under MCDR, 1988 was accounted for mainly by Odisha (34%), Goa (18%), Karnataka (15%), Chhattisgarh (14%), Rajasthan (7%), Andhra Pradesh (5%), Madhya Pradesh (3%), Maharashtra (2%), Tamil Nadu and Gujarat (1%). Realising the importance of mining sector, Government of India has been formulating and implementing various policies to utilise the mining resources of India in sustainable manner.

A. *Mineral Policy in India*

In India, the first step towards the adoption of formal regulation of mining industry took place in the year 1957 with the enactment of the Mines and Minerals (Regulation and Development) Act, 1957. It deals with the management and development of minerals under the control of the union Government. In the process, several times the act have been amended. In order to liberalise the mineral sector, the union Government declared the mineral policy in the year 1993. This policy for the first time encouraged the private investment in mining exploration. Mineral development and protection of forest, environment, and ecology were major focused area of the policy. Local stakeholders are considered for mining development, as a result of which emphasis was given to the local tribal people in mining areas. Besides this, the management of mineral waste was one of the major focused areas of the policy.

In the passage of time, India has been more concerned towards the need of energy, metal and commodity sector for infrastructural development. The central Government of India replaced the existing mineral policy with a new mineral policy in the year 2008. The new mineral policy was concerned with sustainable framework for optimum utilisation of resources. In addition to the sustainable framework, economic growth with social justice was the other focused areas of the policy. It also focused on improving quality of life of people in backward mining areas of the country by properly utilising the mineral resources.

IV. Methodology

Mining data in case of India is maintained by various Government departments. The Indian Bureau of Mines (IBM) is the principal source of data related to the mining information. The website of IBM has been used to collect information on current status of mining in India. The data on total mineral production in terms of quantity and value is extracted from "Mining Brochure 2004-2010" data set of IBM. We have taken the data of 11 states of India which are having the largest concentration of mines and are treated as major mining states of India (IMY, 2011). All the data on mining production and total value of production are from the 2008-09 financial year. We have considered the available data on total value of production as the proxy of mining activities.

Socio-economic wellbeing and quality of living are considered as indicators of development. Improvement in the socio-economic condition as well as the quality of life indicates that society is on the path of sustainable development. Data relating to the socio economic and quality of life indicators have been collected from different publications of various Government departments and agencies. The socio-economic and quality of life variables used for the present study are : total employment in mining activities; per capita income; poverty ratio; access to electricity which is indicated by ratio of electrified villages to total villages; unemployment rates; illiteracy; access to tele-communication; expected year of living.

In the present study, we have examined the relationship between total value of mineral production as a measure of mining activities with the socio-economic and quality of life variables. Cross correlation technique has been adopted to investigate the relationship between the variables. The cross correlation of all socio economic and quality of life variables will be investigated with total value of mineral production. For each of the calculated values, p-value has been calculated to test the statistical significance of the correlation results. The analysis of this paper is carried out by using the statistical package Stata-11.

V. Results and Analysis

Perusal of the Table 1 reveals that the presence of negative association between quality of life indicators and total value of mineral productions for the 11 states of India. Our result holds that mining activity is significantly associated with decline in per capita income, literacy rate and life expectancy. In the mining states, quality of life has not been improved with the increasing mining activities. Mining activities provide employment opportunity to the people but the per capita income is not moving in the same direction.

In addition to the quality of life indicators, some of the socio-economic variables significantly support the presence of low quality of development in mining states. Per capita income and tele-density are negatively associated with the total value of mining production. Besides this, the poverty ratio is positively associated with mining activities. Though the relationship between electrified villages and total value of mineral production shows a negative correlation, it is not significant.

Our result supports many research work which are undertaken within the regions of a country and find that resource curse exists in resource rich countries. Findings of our study support the findings of the study made on United States (Papyrakis and Gerlagh, 2007) but differ from the findings of the study made in Spain (Domenech, 2008) and Australia (Hajkowicz et al., 2011) on impact of mining on quality of life within a nation.

Government policy on mineral revenue and its proper management plays significant role in development process. Good quality of administration and transparency in management of resource revenue leads to development of any country.

Table 1: Results of Cross Tabulation of Correlation Coefficients

Variables	Total Value of Production	Total Mining Employment	Per Capita Income	Poverty Ratio	Tele Density	Literacy Rates	Electrified Villages	Life Expectancy
Total Mining Employment	0.726** (0.006)	- -	- -	- -	- -	- -	- -	- -
Per Capita Income	-0.666* (0.013)	-0.562* (0.036)	- -	- -	- -	- -	- -	- -
Poverty Ratio	0.673* (0.012)	0.561* (0.036)	-0.786** (0.002)	- -	- -	- -	- -	- -
Tele density	-0.591* (0.028)	-0.697** (0.009)	0.504 (0.057)	-0.846** (0.001)	- -	- -	- -	- -
Literacy Rates	-0.717** (0.006)	-0.644* (0.016)	0.884** (0.000)	-0.625* (0.020)	0.510 (0.055)	- -	- -	- -
Electrified Villages	-0.517 (0.052)	-0.644* (0.016)	0.615* (0.022)	-0.602* (0.025)	0.665* (0.013)	0.547* (0.041)	- -	- -
Life Expectancy	-0.703* (0.026)	-0.540 (0.083)	0.863** (0.003)	-0.837** (0.005)	0.756* (0.015)	0.650* (0.041)	0.499 (0.104)	- -
Unemployment Rates	-0.495* (0.041)	-0.201 (0.276)	0.780** (0.002)	-0.528* (0.047)	0.112 (0.372)	0.553* (0.039)	0.273 (0.208)	-0.061 (0.443)

Note: ** and * indicate significant at 1% level and 5% level respectively

Negative relationship between the human development indicators and total value of mineral production in case of Indian states is an unravelled phenomenon. A negative relationship between the per capita income and total value of mineral production is matter of concern. In the long run, it may hamper the welfare improvement capacity of the endowed natural resources and does not help the primary stakeholders to improve their standard of living in mining sector of India.

VI. Conclusion

To conclude, the main findings are consistent with the established views on resource curse hypothesis which support the existence of negative associations of resource endowment with 'socio-economic conditions' and 'human development factors' in mining rich states of India. We conclude with the results that in case of Indian mining states, resource curse hypothesis holds good. The quality of life and socio economic condition has not improved in spite of large concentration of mineral deposit and mining activities over the years. Research on inequality and disparity among mining community will add more to the present result. Thus, the result aim to pave the path for in-depth research in future in the field of natural resources and its implication towards socio-economic development of mineral rich states of India.

References

[1] Atkinson, G., Hamilton, K., "Savings, growth and the resource curse hypothesis". World Development. Vol. 31, pp.1793–1807, 2003

[2] Auty, R., Sustaining Development in Mineral Economies: The Resource Curse Thesis. Routledge, London, 1993

[3] Brunnschweiler, C., "Cursing the blessings? Natural resource abundance, institutions, and economic growth." World Development. Vol. 36, pp. 399–419. 2008

[4] Bulte, E.H., Damania, R., Deacon, R., "Resource intensity, institutions and development." World Development . Vol. 33, pp. 1029–1044. 2005

[5] Bush, R., "Scrambling to the bottom? Mining, resources and underdevelopment." Review of African Political Economy. Vol. 35, pp. 361–366. 2008

[6] Domenech, J., "Mineral resource abundance and regional growth in Spain, 1860–2000." Journal of International Development. Vol. 20, pp. 1122–1135. 2008

[7] Indian Minerals Yearbook(IMY) 2011, Indian Bureau of Mines, Government of India, 2011.

[8] Government of India. Report on employment and unemployment survey 2011-12, Ministry of Labour and Employment, Labour bureau, Chandigarh. 2011-12

[9] Gylfason, T., Herbertsson, T., Zoega, G., "A mixed blessing: natural resources and economic growth." Macroeconomics Dynamics. Vol. 3, pp. 204–225. 1999

[10] Hajkowicz, Stefan A., Sonja Heyenga and Kieren Moffat, "The relationship between mining and socio-economic well being in Australia's regions." Resource Policy. Vol. 36, pp. 30-38. 2011

[11] Papyrakis, E., Gerlagh, R., "Resource abundance and economic growth in the United States." European Economic Review. Vol. 51, pp. 1011–1039. 2007

[12] Sachs, J., Warner, A., "Natural resource abundance and economic growth." National Bureau of Economic Research Working Paper No. 5398, Harvard University, Cambridge, MA. 1997

[13] Sachs, J., Warner, A., "The big push, natural resource booms and growth", Journal of Development Economics, vol. 59, pp. 43-76, 1999

[14] Weber-Fahr, M., Treasure or trouble? Mining in developing countries. World Bank Group Mining, World Bank, International Finance Corporation. 2002. access from </http://www.eldis.org/assets/Docs/30074.html>