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The Impact of Covid-19 Pandemic on Minerals in India: An Overview

Dilip Barman
Department of Commerce, University of Kalyani, West Bengal, India

Corresponding Author's Email: barmandilip58@gmail.com

ABSTRACT

The COVID-19 pandemic has caused global disruption in various segments as of early 2020. sector is one of them in India. India is endowed with major and minor minerals. These minerals are used as raw materials for manufacturing as well as for construction purposes. For instance, the supply of minerals has a negative effect in this pandemic. For instance, the lockdown effect smashed the global supply chains, factory closures, etc. On the demand side, the closure of non-essential economic activities has significantly reduced consumption. The study tries to explore the mineral resources available in India and the effect of COVID-19 on mineral production in the financial year 2020–21. The outcome shows that the pandemic and the country's wide lockdown have negatively impacted on mineral production and national income.

Keywords: *Minerals Resources; Metallic; Non-metallic; Royalty;* COVID-19*ers; Disruption; Irish Centre for Research in Applied Geosciences (iCRAG)*

INTRODUCTION

Mineral resources are the resources that can naturally exist on the planet. The prosperity of human beings mostly depends on a healthy ecosystem, as it provides every eventual element of living. In natural resources, minerals play an important role in industrial as well as social development, growth, poverty reduction, etc. (Gałaś *et al.*, 2021). Mineral resources refer to all types of metallic, non-metallic, and fuel minerals that exist in the environment's assets and incorporate the wide range of services provided by ecosystem assets. Minerals can constitute the essential raw material, which can help many industries in their manufacturing process (Anser *et al.*, 2021). The extensive availability of minerals provides an opportunity for economic growth, employment, and the welfare of a country. Minerals' most important properties are those that have improved our standard of living and well-being. They are particularly non-renewable resources, which require protecting these resources from illegal activities.

The performance of the mining sector is incomparable in the Indian economy (KPMG, 2020). The country has a large supply of both metallic and nonmetallic minerals. Since independence, the country has experienced incremental growth in mineral production both in terms of quantity and value. This study demonstrates how the COVID-19 pandemic hampered mineral production and revenue from mineral resources.

LITERATURE REVIEW

Gałaś *et al.*, (2021) analysed that, "Impact of Covid-19 on the Mining Sector and Raw Materials Security in Selected European Countries" and revealed that, the COVID-19 have a long term effects on exploration and development of new mines and having potentiality of disrupted the supplies of raw materials. Anser *et al.*, (2021), studied that, "Environmental and natural resource degradation in the wake of COVID-19 pandemic: a wake-up call" and said that how COVID-19 pandemic effects the environmental sustainability rating by destroyed the minerals resources process and population growth. Hitzman *et al.,* (2020) evaluated that, "Impact of the COVID-19 Pandemic on the Minerals Sector: A Real Time Survey" and observed effects of Covid-19 pandemic on minerals sector workface,

global development, employment such as lost job or temporarily place off or reduced working hours. It was discussed that, "Impact of COVID-19 on The Mining Sector India" and reported that negative implications on Indian mining companies, lower mineral revenue which affects government exchequers and also entire business eco-system (KPMG, 2020). Ramdoo (2020), described in her study, "The Impact of COVID-19 on Employment in Mining" and find out that extended lockdown has negative impact on employment, productivity, and future investment plans.

Objectives of the Study

The objectives of this study are the indicate major mineral resources in India and the impact of COVID-19 on mineral production as well as revenue from mineral resources.

METHODOLOGY

The research work is based on secondary sources and is empirical in nature. The time period used for the comparison is from the years 2016–17 to 2020–21, for which the diagram has been formed. The analysis part is done on the basis of secondary data that was collected from various reports on environmental accounting of mineral resources, particularly annual reports of the national mineral inventory (ministry of mines) of the government of India.

RESULTS AND DISCUSSION

India is possessed of a variety of mineral resources which provide the country with a dynamic industrial base. The country is especially wealthy both in reserves and production of metallic minerals such as bauxite, chromite, iron ore, manganese ore, zinc concentrate, etc. Besides, among the non-metallic minerals, mica is the most important one in India, along with some other non-metallic minerals like limestone, magnesite, and phosphorite. In another way, mineral fuels include coal, petroleum, and natural gas etc.

Table1: Index of Minerals Production (Base year 2011-12=100)

Year	Index no.
2016-17	102.50
2017-18	105.90
2018-19	108.10
2019-20	109.60
2020-21	89.20

Source:https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final%2017052021.pdf

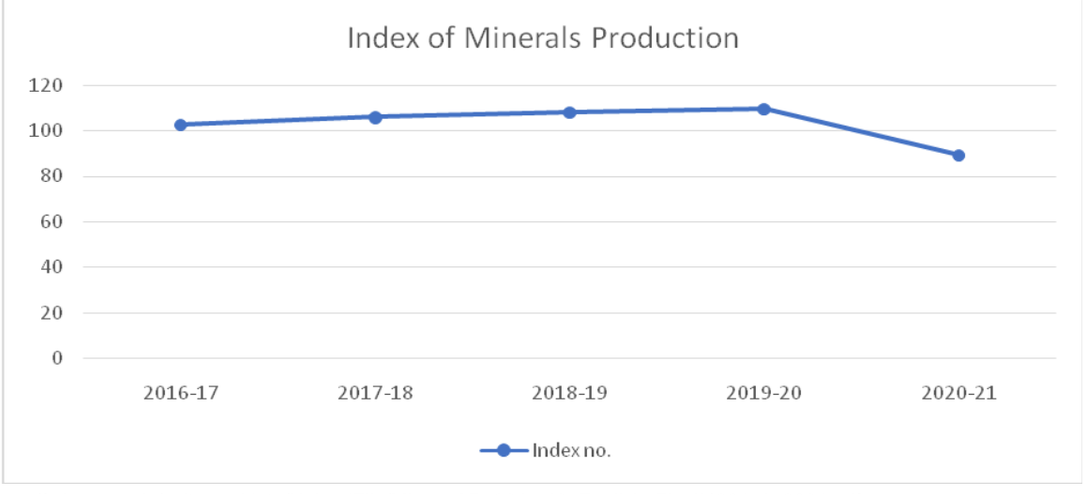

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Figure 1: Index of Minerals Production

Based on overall trend, the index of mineral production (base year 2011-12 = 100) for the year 2017-18 is estimated to be 105.90 as compared to 102.50 of previous year 2016-17, which shows a positive growth of 3.32%. Therefore, the index for the year 2018-19 is estimated to be 108.10 which is excess of 105.90 for the previous year 2017-18, exhibiting improvement of 2.08%. After that, the index for the year 2019-20 is estimated to be 109.60 which is surplus of 108.10 of the previous year 2018-19 and point out increasing of 1.39%. Finally, the index of mineral production for the year 2020-21 is estimated to be 89.20 as compared to 109.60 of previous year 2019-20, indicating a negative growth of18.61% due to COVID-19 pandemic.

Table-2: Number of Reporting Mines (excluding atomic, fuel and minor minerals)

Year	Metallic Minerals	Non-metallic Minerals	Total
2016-17	644	864	1508
2017-18	638	792	1430
2018-19	597	767	1364
2019-20	566	737	1303
2020-21	545	684	1229

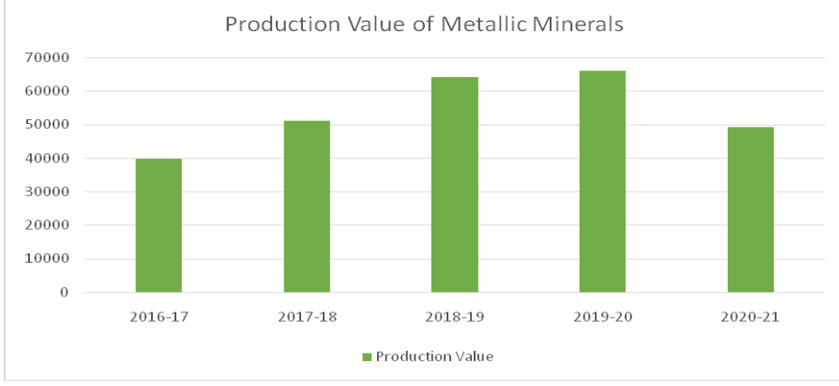
Source: https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final%2017052021.pdf

According to National Mineral Inventory (Ministry of Mines), the number of mines which reported mineral production (except atomic, fuel, and minor minerals) in India gradually reducing over the year 2016-17 to 2020-21.

Table- 3: Production of Selected Metallic Minerals in India (excluding atomic and minor minerals) (Value in crore.)

Metallic minerals	Unit	2016-17		2017-18		2018-19		2019-20		2020-21 (Estimated)	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Bauxite	Thousand tonnes	24745.49	1486.55	22786.11	1578.42	23687.72	1716.84	21823.79	1578.56	21239.97	1629.02
Chromite	Thousand tonnes	3727.78	3193.75	3480.94	3203.70	3970.69	3583.61	3929.26	3332.66	1250.25	712.72
Copper Conc.	Thousand tonnes	134.79	650.61	141.99	770.66	155.44	939.52	124.69	844.58	100.94	796.47
Gold	Kg.	1595.00	436.24	1650.00	476.98	1664.00	524.17	1724.00	643.10	1193.00	589.08
Iron Ore	Million tonnes.	194.58	25229.18	201.42	34713.10	206.45	45184.14	246.08	48107.41	188.63	34508.61
Lead Conc	Thousand tonnes	268.05	966.93	306.40	1142.94	358.37	1631.68	351.27	1807.28	405.47	1889.39
Manganese Ore	Thousand tonnes	2395.14	1624.84	2599.81	1990.75	2820.23	2270.25	2904.37	1941.64	2120.20	1494.40
Zinc Conc	Thousand tonnes	1484.24	4338.56	1539.66	4979.93	1457.17	5608.38	1446.82	6023.12	1655.46	6637.94
Other Met. Minerals			1832.95		2119.04		2583.86		1805.67		1027.59
Total			39759.61		50975.52		64042.45		66084.02		49285.22

Source: https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final%2017052021.pdf



Source: https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final%2017052021.pdf

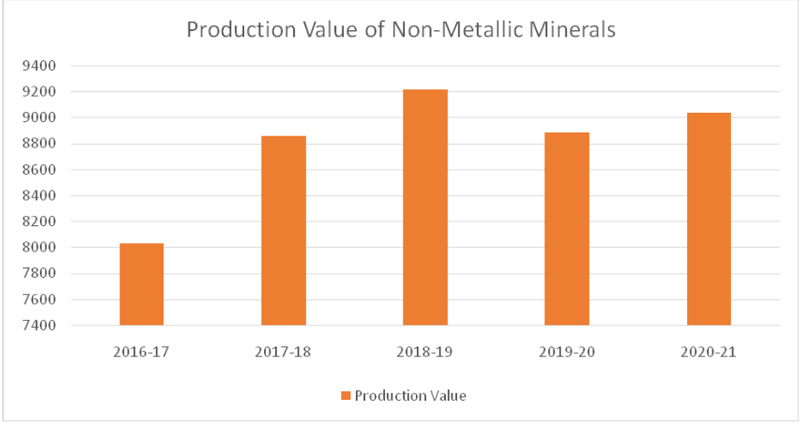
Figure 2: Production Value of Metallic Minerals

As per report, total value of metallic minerals production during the year 2017-18 increased by 28.21% as compared to 2016-17. Therefore, during the year 2018-19 the value of metallic minerals production excess of 25.63% as compared to 2017-18. After that in the year 2019-20 shows slightly increasing rate of 3.19% over the year 2018-19. Finally, during the year 2020-21, total value of metallic minerals production decreased by 25.42% as compared to the previous year 2019-20. As well as we can see, most of the quantity production of metallic minerals (Chromite, Copper conc, Gold, Iron Ore and Manganese ore) decreased during the year 2020-21 due to COVID-19 pandemic and lockdown.

Table 4: Production Selected Non-Metallic Minerals in India (excluding atomic & minor minerals) (Value in crore.)

Non-metallic minerals	Unit	2016-17		2017-18		2018-19		2019-20		2020-21 (Estimated)	
		Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Coal	Tonne mn	689.810	-	711.681	-	760.407	-	753.937	-	756.494	-
Crude oil	Barrel/day	720.842	-	719.877	-	695.619	-	654.584	-	615.664	-
Natural gas (consumption)	Cub ft/day	4.901	-	5.199	-	5.620	-	5.733	-	5.751	-
Mica	Metric tons	14000.00	-	14000.00	-	15000.00	-	15000.00	-	15000.00	-
Diamond	Carat weight	36491.00	63.96	36491.00	37.41	36491.00	58.11	36491.00	39.81	36491.00	30.04
Garnet	Thousand tonnes	85.413	78.73	158.28	161.89	123.40	156.82	0.55	0.47	1.14	0.51
Limeshell	Thousand tonnes	12.344	3.48	14.77	5.14	7.54	2.78	4.60	1.87	0.00	0.00
Limestone	Million tonnes	314.669	7387.84	340.42	8099.57	379.05	8484.11	359.33	8312.02	353.47	8340.91
Magnesite	Thousand tonnes	299.149	74.93	195.06	59.37	146.58	39.66	97.68	35.03	73.55	28.62
Phosphorite	Thousand tonnes	1124.44	299.67	1515.65	366.83	1284.58	354.76	1400.19	431.91	1648.00	572.24
Sillimanite	Thousand tonnes	68.131	53.59	81.64	67.17	69.03	55.98	13.24	3.63	17.52	4.31
Wollastonite	Thousand tonnes	166.186	15.88	153.05	12.60	184.06	17.40	124.66	11.91	116.14	10.81
Other Non-Met. Min			51.10		45.48		45.30		45.12		50.52
Total			8029.18		8855.46		9214.92		8881.77		9037.96

Source: https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final%2017052021.pdf



Source: https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final%2017052021.pdf

Figure 3: Production Value of Non-Metallic Minerals

Based on above report, total value of non-metallic minerals production during the year 2017-18 increased by 10.29% as compared to 2016-17. Afterwards, during the year 2018-19 the value of non-metallic minerals production excess of 4.06% as compared to 2017-18. Thereafter in the year 2019-20

shows diminishing rate of 3.62% over the year 2018-19. Lastly during the year 2020-21, total value of non-metallic minerals production slightly raised by 1.76% as compared to the previous year 2019-20. As well as we can see, most of the quantity production of non-metallic minerals especially crude oil, garnet, magnesite, Lime shell decreased during the year 2020-21 due to COVID-19 pandemic and lockdown.

Table 5: Share of states in percentage of mineral production

States	2016-17	2017-18	2018-19	2019-20	2020-21
Rajasthan	12%	20.25%	17%	17%	17%
Odisha	11%	17.77%	24%	25%	14%
Chhattisgarh	7%	8.80%	9%	8%	8%
Jharkhand	7%	-	-	-	-
Gujarat	7%	5.66%	5%	5%	6%
Andhra Pradesh	6%	9.45%	9%	8%	13%
Madhya Pradesh	6%	-	-	-	6%
Uttar Pradesh	-	4.98%	5%	5%	4%
Telangana	5%	6.06%	7%	7%	8%
Assam	4%	-	-	-	-
Karnataka	-	7.83%	8%	9%	7%
Maharashtra	-	4.67%	4%	4%	4%
Bihar	-	3.77%	3%	3%	-
Off-shore	20%	-	-	-	-
Other states	15%	10.75%	9%	9%	13%
Total	100%	100%	100%	100%	100%

Source: https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final% 2017052021.pdf

The above (Table-5) shows percentage of minerals production as per states of India from the year of 2016-17 to 2020-21 reported by National Mineral Inventory (Ministry of Mines) which indicate that Rajasthan and Odisha have major mineral production as compared to other states.

Table 6: State wise Royalty Accrual of Major Minerals (excluding fuel, atomic and minor minerals) (Value in lakhs.)

States	2016-17	2017-18	2018-19	2019-20
Andhra Pradesh	33647.00	33492.00	41797.00	N/A
Assam	528.00	464.00	503.00	710.00
Bihar	152.00	153.00	589.00	N/A
Chhattisgarh	111533 .00	165130.00	221167.00	218472.00
Goa	31475.00	23961.00	2231.00	510.00
Gujarat	27044.00	26366.00	27041.00	21832.00
Himachal Pradesh	7082.00	13175.00	N/A	N/A
J & K	946.00	1544.00	928.00	N/A
Jharkhand	69037.00	125559.00	N/A	N/A
Karnataka	103433.00	127140.00	128324.00	142483.00
Kerala	645.00	851.00	535.00	N/A
Madhya Pradesh	37792.00	46166.00	53880.00	N/A
Maharashtra	14562.00	17146.00	19598.00	18273.00
Meghalaya	4470.00	5592.00	8639.00	N/A
Odisha	249634.00	347041.00	758117.00	784351.00

Rajasthan	236612.00	264897.00	290859.00	N/A
Telangana	20126.00	22927.00	23578.00	20743.00
Tamil Nadu	20210.00	15067.00	N/A	N/A
Uttarakhand	32.00	26.00	40.00	N/A
Uttar Pradesh	628.00	1919.00	N/A	N/A
Total	969588.00	1238616.00	1577826.00	1207374.00

Source: https://mines.gov.in/writereaddata/UploadFile/Mines_AR_2017-18_English_Final%2017052021.pdf

Loss estimation during the year 2020-21 due to COVID-19 pandemic:

In the COVID-19 pandemic, there was a nation-wide lockdown. The reduced demand forced the miners to run the production either by utilising lower capacity or shutting down the operations temporarily. This situation blows the production operation that affects the royalties as well as the tax income of the government. For example, during this pandemic in Odisha's state, the production functions were conducted at 40% or 50% capacity. As a result, production of iron ore and chromite ore was reduced by 5.0 and 0.15 metric tonnes in the starting month (Apr'20-Jun'20) of 2020–21 and this caused a loss of about 400 cr per month to the state exchequer (KPMG, 2020).

Impact on minor minerals:

The COVID-19 pandemic has significantly impact on minor minerals. Minor minerals are those which have been taken an important role in part on national income. The revenue generated from minor minerals was INR54,569 crore in financial year 2019-20 which amounted 44% of the total revenue from minerals in India. Among the top minerals production states, the large portion of the value of minor minerals production collected from Andhra Pradesh (89%) and Rajasthan (47%). Minor minerals can be classified in to two categories (based on usage):

a) Minor minerals such as barytes, calcite, felsite, quartzite which are used in manufacturing sector.

b) Minor minerals such as granite, shingle, road metal etc which are used in construction sector.

Therefore, this pandemic situation significantly disrupted the manufacturing and construction activities in the country. Also, the COVID-19 pandemic disrupted the global trade as well ae humbled the global markets. For example, barytes (used as oil and gas drilling), which is usually exported to Middle East and U.S. Likewise, granite (used as decorative stone), which is basically exported to China, USA etc. Hence, the COVID-19 pandemic impact on demand as well as production of minor minerals (KPMG, 2020).

Worldwide Responses of COVID-19 Impact:

On 31st December 2019 corona virus was first reported from Wuhan, China and the disaster started all over the globe. At the end of April 2020, researchers of Irish Centre for Research in Applied Geosciences (iCRAG) experiment the effects of COVID-19 pandemic on minerals sector. The survey provides that the novel global events are disrupted by the impact of pandemic at its eventual moment of development. After the starting of pandemic, the World Health Organizations agreed that COVID-19 pandemic had significant effect on their employment and confirm that pandemic has negative impacts on their work life like lost job, furloughed, temporarily shut down or reduced hours (Hitzman *et al.*, 2020***).***

Table 7: Worldwide Responses

Continent	Pct. (%)	Commodity	Pct. (%)	Employment type	Pct. (%)	Employment status	Pct. (%)	Age group	Pct. (%)
Asia	07	Base metals	32	Employed	55	Job ended	09	18-30	17
Africa	06	Industrial metals	07	Unemployed	04	Reduced hours	18	31-45	32
Australia	05	Precious metals	47	Consultant	27	Furloughed	05	46-60	24
Europe	14	Others	14	Student	10	No change	65	61+	27
North America	49	-	-	Retired	04	No opinion	03	-	-
South America	06	-	-	-	-	-	-	-	-
Others	13	-	-	-	-	-	-	-	-

Source: https://www.segweb.org/pdf/publications/discovery/2020/SEG-Discovery-122-2020-July-COVID-Articles.pdf

According to the survey respondents, the report says most of the respondents from North America (49%) are conform the significant impact of COVID-19 pandemic. The minerals sector from different continent are suffered from this pandemic mostly on production of minerals such as base metals (32%), precious metal (47%). The most important fact is that the respondents from employment sector agreed that their work life has smashed during this pandemic due to continuous lockdown such as job ended (9%), reduced hours (18%), furloughed (5%). As per the source report, in Africa where respondents are reported highest rate of negative impact on employment status along with the different age group (Hitzman *et al.*, 2020).

CONCLUSION

Mineral resources are an integral part of modern society because they are critical to industrial development, economic improvement, and the smooth operation of daily life.It is gaining importance gradually as it ensures sustainable development by creating a linkage between the environment and the economy. The paper has tried to highlight the impact of the COVID-19 pandemic on different mineral resources and production in India. The study found that in most cases, the production of minerals (metallic and non-metallic minerals) and fuel minerals (crude oil) decreased in the years 2020–21, as well as it is estimated that revenue from mineral resources would decrease in the years 2020–21 due to the COVID-19 pandemic and the continuously lockdown situation in India.

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