



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

“ANALYSIS OF SOCIO-ECONOMIC DEVELOPMENT IN LOCAL REGION WITH ESTABLISHMENT OF BHARAT OMAN REFINERY LIMITED AT BINA CITY OF MADHYA PRADESH”

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ABSTRACT :

The Research presents a case study of the BORL refinery in Bina (M.P.). This study analyses the costs and advantages of one of the world's largest refinery projects, with a focus on social welfare. The research analyses whether BORL at Bina (M.P.) is economically beneficial to the region, state, and country through a Social Cost Benefit Analysis of the project. The report examines the economic implications of BORL refinery construction and operations on local communities, including on-site labour, revenue, supply chain, and induced impacts, as well as employment creation. The research examines the economic effects of refinery operations at the regional, state, and national levels, including the multiplier effect of income, taxes, and savings.

This includes any additional project-related externalities. Further research could explore India's strategic food and oil security from a macroeconomic perspective, as well as investor and consumer confidence in self-reliance in producing and oil and natural gas. In this research we used Cost Benefit Analysis (CBA) and Social Cost Benefit Analysis (SCBA) approach. After this research we came to conclusion that BORL will be established in Bina, a rising city in Madhya Pradesh. Here, the establishment of BORL has resulted in substantial social and economic development for the city. The study sought to examine the growth in the decade after BORL's establishment. The study used cost-benefit analysis and financial analysis tools to determine the benefit to society. Following the formation of BORL, the city experienced growth in a variety of sectors, including healthcare, literacy, urbanisation, and employment. The city has seen significant growth in housing development; prior to the refinery, there were approximately 110 residential units; now, there are 945. Following the establishment of BORL, 24 clinics and medical stores were opened with a total investment of 51.2 lakhs. The number of literacy educational establishments has also expanded from 18 (before) to 48 (post), with a total investment of 22.7 crores. Local business has also grown, with 1930 local businesses/service providers opening outlets in the city. Other infrastructure has grown with a 1.91 crore investment. Overall, this has made a significant contribution to job creation in the city following the establishment of the refinery.

CHAPTER-1

INTRODUCTION

1.1 GENERAL

Bina, a stunning city in Madhya Pradesh (M.P.), India's Sagar region, has experienced tremendous growth in recent years, largely due to the establishment of the Bharat Oman Refineries Limited. Here are some salient details regarding the refinery's contribution to Bina City's overall development.

Initially, Bharat Petroleum Corporation Limited (BPCL) and Oman Oil Company Limited (OOCL) established Bharat Oman Refineries Limited as a joint venture. In June 2021, BORL became a fully owned subsidiary of BPCL, and the two companies are currently merging. BPCL runs a 7.8 MMTPA refinery in Madhya Pradesh's Bina, District - Sagar. With a 7.8 MMTPA crude processing capacity, Bharat Oman Refineries Limited (BR) is now set up to produce auto fuels.

BR has decided to diversify into petrochemicals by using bulk commodity chemicals based on ethylene and propylene to stay competitive and increase refinery profitability. The Petrochemical Diversification Plan of Bharat Oman Refineries Limited aims to increase the refinery's capacity from its current 7.8 MMTPA to around 12 MMTPA, as well as establish global Ethylene Cracker facilities and related downstream petrochemical plants in Bina.



Figure 1Bharat Oman Refineries Limited

SOCIAL DEVELOPMENT

1 Health and Education: As part of its corporate social responsibility (CSR) efforts, the refinery frequently provides financing to regional hospitals and schools, enhancing Bina's general standard of living.

2 Medical Facilities: The refinery has established clinics, hospitals, and health camps as part of its investments in the community's healthcare system.

3 Health Programs: The community's general health standards have improved as a result of several health programs and initiatives, including immunization drives and health awareness campaigns. the construction of new medical facilities and the renovation of old ones. Thousands of locals have benefited from healthcare camps made possible by the refinery. A 100-bed hospital has been established in Bina thanks to the refinery. Furthermore, nearly 10,000 locals benefit from sporadic health camps each year.

4 Schools and Colleges: New schools and colleges have been established as a result of investments in educational infrastructure, giving local children better educational options. The refinery has provided funding for the establishment of multiple educational institutions and career centres.

For instance, throughout the past ten years, the number of schools in the area has grown by about 30%. In the past ten years, one vocational training center and five additional schools have been established thanks to support from the refinery.

5 Literacy Rate: Over the previous ten years, Bina's literacy rate has risen from 72% to 78%, in part because of educational programs funded by the refinery.

Training and Scholarships: To improve the employability and skill sets of young people in the area, the refinery provides training and scholarships for vocational training.

6 Community Development: The refinery launched several community development initiatives that have raised locals' standards of living. The refinery has helped to enhance sanitation and hygiene in the neighboring villages by funding the installation of over 1,000 domestic toilets.

7 Community Assistance CSR Initiatives: Community development projects like rural electrification, sanitation campaigns, and water supply projects are among the refinery's corporate social responsibility (CSR) initiatives. Over the previous five years, the refinery's CSR spending has continuously fallen between 15 crore and 25 crore yearly. The annual CSR expenditure has fluctuated between 10 crore and 20 crore in the past few years. Numerous CSR programs, such as health camps, skill development courses, educational scholarships, and infrastructure projects, have helped thousands of locals. Through programs financed by refineries, almost 5,000 people have obtained vocational training, increasing their employability. Cultural Programs: The cultural life of the people of Bina has been enhanced through the sponsorship of recreational and cultural events. The refinery devotes a considerable amount of its earnings to the best possible.

1.3 ECONOMIC DEVELOPMENT

1 Employment Generation: Numerous work opportunities have been generated by the refinery, both directly and indirectly. It has a sizable workforce that works in a variety of roles, from administrative support to skilled technicians.

Direct Employment: Thousands of workers, including engineers, technicians, managers, and other support staff, are directly employed by the refinery. Between 1,000 and 2,000 workers are directly employed by Bharat Oman Refineries Limited (BORL) in the Bharat Oman Refineries Limited. Approximately 1,200 people are directly employed by the Bharat Oman Refineries Limited as of the most recent reports.

Indirect Employment: A plethora of auxiliary businesses and service providers, including raw material suppliers, transportation firms, and maintenance firms, have cropped up around the refinery, giving the residents of Bina City more work options. It is believed that through ancillary companies and service providers, the refinery indirectly supports between 5,000 and 7,000 employees in the area. The refinery's operations have indirectly created between 7,000 and 8,000 jobs in industries including retail, services, and transportation.

2 Local Business Boost: Local businesses including restaurants, retail stores, and other service providers have benefited from the increased demand for products and services brought about by the inflow of refinery personnel.

3 Support for the Local Economy Greater Spending Power: The refinery workers and their families have more money to spend, which they use to invest in regional markets and support the local economy. Business Opportunities: Bharat Oman Refineries Limited has raised demand for a variety of goods and services, which has led to the growth of small and medium-sized firms (SMEs). Regional Economy: Madhya Pradesh's financial stability and growth prospects are improved by the refinery, which makes a substantial contribution to the region's economy. A quarter of a million more commercial buildings, including stores, eateries, and service centers, have opened in the past ten years.

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1.4 INFRASTRUCTURE IMPROVEMENT

1 Urbanization: The refinery's construction has accelerated Bina's urban development, bringing better utilities including transport and housing. Urban Development Housing Sector: New housing complexes and colonies have been developed as a result of the demand for residential real estate. New residential colonies have emerged as a result of the Bharat Oman Refineries Limited's construction. Over the previous ten years, Bina has seen a roughly 35% increase in the number of residential units. Commercial Spaces: As a result of the population increase, more businesses, including retail centers, offices, and leisure centers, have been built.

2 Road Connectivity: The local populace has profited indirectly from improved road infrastructure that makes it easier to transport completed goods and raw materials.

Interaction.

Roads & Transportation: To improve connectivity both inside and outside of Bina, better road networks and transportation options have been created to make it easier to transfer people and commodities. To increase connectivity, numerous road development projects have been started. For example, the refinery's existence has directly contributed to the development of municipal and state highways. In Bina, there has been a noticeable surge in real estate construction. To handle the increasing number of families and refinery workers, new residential zones have been built. One of the important road developments in Madhya Pradesh is the NH 146B, which connects Bina to other major cities. It has been strengthened and widened. Improvements to the road infrastructure have cost around 200 crores.

Public Transportation: The local populace now has easier access to better public transportation alternatives, which facilitates commuting. Since the refinery started operating, Bina has seen a 40% growth in the number of small and medium-sized businesses (SMEs).

CHAPTER-2

LITERATURE REVIEW

Ameer H. Al-Rubaye et al., 2023 reviewing how much environmental pollution, such as air, soil, and water pollution, which in turn affects the environment, is impacted by oil refineries' hazardous and destructive emissions is the purpose of the current study. Petroleum refineries can be enormous, wide factories with a lot of pipe running throughout, transporting streams of fluids via distillation columns and other chemical processing machinery. One of the major issues with this is the conflict between the economic benefits and the need for refineries throughout the world on the one hand, and environmental concerns on the other. The most frequent gases released into the environment around refineries are, in general, sulphur oxides (SOx) and nitrogen oxides (NOx). Furthermore, heavy metals including cadmium, lead, copper, and zinc are also discharged into the environment along with other compounds like polycyclic aromatic hydrocarbons, toluene, and phenol. In general, living close a refinery has been demonstrated to have cumulative, long-term health effects due to hazardous fumes, chemical spills, and explosions, according to several studies. Some of the detrimental health effects include an increased risk of developing asthma, malignancies, birth defects, neurological and cardiovascular damage, breathing difficulties, and blood disorders[2].

Youssef A. Haddad, 2020 explained imperative subject constitutes a special category compared to the subjects of other types of clauses in that it is required to be the addressee. Zanuttini (2008) argues that this requirement follows from a special syntactic status: imperative subjects enter the computation with gender and number but no person features. They acquire a second-person specification later by entering an agreement relation with the head of a jussive phrase, a functional projection that is unique for imperative clauses and that occupies the left periphery. This paper provides independent evidence from attitude dative constructions in Levantine Arabic in support of this approach. Attitude datives are optional pronominal elements that make pragmatic contributions to utterances without altering their meaning. The paper shows that attitude datives whose referent coincides with the referent of the subject are less restricted in terms of the interpretation they may receive in imperative versus other types of clauses. Imperative clauses are more permissive, a characteristic that follows from the special status of their subject[34].

Pravin U et al. 2012 explained about deals with quantification of accumulated toxic heavy metals in sediments of Mithi River of Mumbai. The study was performed at three different sampling locations along the flow of Mithi River for two years from 2009-12. The different heavy metals studied were Al, As, Cd, Cr, Hg, Ni, Pb, Sr and Mn. The results of our study indicate that the concentration level of these toxic heavy metals for the two assessment years increases by the factor of 1.2-5.8 µg/g. The result is a clear indication of day by day increasing pollution level of the Mithi River, which is creating a negative environmental impact on the biological life of the river. The results emphasize the need for regular scientific monitoring of different pollutants adversely affecting the environment and to reframe the pollution control strategies already in existence[8].

Andhra Pradesh (**Machender et al., 2014**) and in Balnagar region, Haryana (**Alexander et al., 2012**)[4,17,26].

Dubey et al., 2010 explained in his paper about spatial samples of surface and ground water collected from land disposal site of dye waste mixed sewage effluents at Binjhole, in Haryana, India were analyzed to evaluate its effect on quality of pond, hand pumps and ground waters for human health and irrigation purposes. It was found that average COD and TDS of dye houses discharge (310 and 3,920 mg/L) and treated sewage (428 and 1,470 mg/L) on mixing acquired the values of 245 and 1,780 mg/L and only Pb (0.24 microg/L) was above the permissible limit for irrigation purpose. Disposal of this mixed water to village pond changes the COD and TDS to 428 and 1,470 mg/L, respectively. COD and TDS of hand pump water samples were 264 and 1,190 mg/L, where as in tube well water these values were 151 and 900 mg/L. Though the ground water contamination seemed to decrease with the increasing distance from the pond but COD, TDS and BOD values continued to be quite high in water samples drawn from the

hand pumps up to a distance of 500 m from pond. However, the major cause of the concern in these waters was Pb (0.11-0.45 ppm). Crops grown with this water shows accumulation of heavy metals like Pb, Cd, Fe, Mn, Ni, Cu, and Zn but in few crops they (Zn, Pb and Cd) exceed the safe limits. Regular consumption of these crop products may lead heavy metal toxicity. It was concluded from this study that the deep seepage of effluents led to deterioration of ground water quality for drinking purposes and the well waters rendered unfit for irrigation purposes within a span of 2 years. This warrants appropriate disposal measures for sewage and dye industry effluents in order to prevent deterioration of ground water and health of human and animals[7].

[Vijendra Singh and C. P. Singh Chandel, 2006](#) Described about heavy metals contamination has been recognized as a major environmental concern due to their pervasiveness and persistence. These heavy metals are not biodegradable, hence there is a need to develop such a remediation technique, which should be efficient, economical and rapidly deployable in a wide range of physical settings. For the characterization of heavy metals of various industrial effluents, some heavy metals, like Arsenic, Cadmium, Chromium, Copper, Iron, Manganese, Nickel, Lead and Zinc were analyzed. The results exhibited that As, Cd, Cr and Pb were not found in any studied wastewater samples, while some of the following heavy metals ranged from: Cu (0.0 - 1.0 mg/L), Fe (0.1 - 0.4 mg/L), Mn (0.0 - 0.4 mg/L), Ni (0.01 - 0.07 mg/L) and Zn (0.68 - 60.84 mg/L). Copper, Iron, Manganese and Zinc were found above the standard limit recommended by IS: 3307 (1977). However, Nickel was found below the regulated safety values for all studied samples[25].

CHAPTER-3

SOCIO-ECONOMIC PROFILE OF THE PROJECT INFLUENCE AREA

3.1 INTRODUCTION

Bina city is located in the area which was earlier location of a village named Etawa. In 1923, a railway junction was constructed in the area and named as Bina Railway Junction since the same was located beside the famous Bina River. It was only after this that the name of the place was changed to Bina Etawa so as to remove the confusion of matching with Itawa at Uttar Pradesh as well as provide a new identity to the area. It was from then onwards that the name on all government documents were changed as well as Bina Etawa Municipal Corporation was constructed.

Bharat Oman Refineries Ltd is promoting the development of a grassroots Central India Refinery Project (CIRP) to be located near Bina, Madhya Pradesh State, India. The refinery will process 6 MM metric tons per year (approx. 120,000 BPD) of crude oil producing fuels products and Lube Oil Base Stocks (LOBS) maximizing LPG and middle distillates (diesel).

Refinery processing scheme was achieved by considering various process options, crude availability, product constraints and product quality targets. This section outlines the general study methodology used and describes the crudes and process configurations considered. Block flow diagrams and unit material balances are provided for the selected refinery process scheme.

3.2 GEOGRAPHY OF BINA

Bina Etawa is located on the meridians based at 24°10' N Latitude and 78°10' E Longitude. The average altitude of the area is 412m from the sea level. Bina tehsil is one of the prominent areas of the state especially for its fertile soil which supports the agriculture here and the main two rivers passing through the tehsil area, the Betwa and Bina river. This two rivers forms the primary water resource for Bina tehsil. The location of the tehsil remains bounded by prominent places of the state which includes Mungaoli Tehsil towards North, Khurai Tehsil towards southern part, Malthone Tehsil towards Eastern zone and Kurwai Tehsil towards west . the soil majorly found here is black soil.

3.3 DEMOGRAPHIC SCENARIO

As per the latest approximation after the census 2011, the city Bina Etawa has a total population of 64,529 inhabitants. The proportions of male inhabitants are higher here in comparison to females living here. The percentage discrimination shows there is a total count of 52% male to a figure of 48% females. However the people here understands the importance of education and that is why as per the latest figures around 73% people are literate which is much higher to the country's average of 59%. Of this there are around 79% male literate and around 65% female literates. The relationship between the growth of population and socio-economic development in the state is very complex. The social, cultural and economic reasons, besides ignorance and lack of access to quality family planning services, are primary reasons responsible for high population growth.

BINA – ETAWA in Sagar (Madhya Pradesh)

3.3.1 Municipality

The population development of Bina-Etawa as well as related information and services (Sources: weather, Wikipedia, Google, images).

Table 1Demographic situation of the project influenced area

Name	District	Population Census 1991-03-01	Population Census 2001-03-01	Population Census 2011-03-01
Bina - Etawa	Sagar	41,621	51,181	64,529
Bina –Etawa				
Population [2011] – Census 64,529				

Name	District	Population Census 1991-03-01	Population Census 2001-03-01	Population Census 2011-03-01
Area 12.00 km² Population Density [2011] 5,377/km² Annual Population Change [2001 → 2011] 2.3%				
Bina-Etawa: city in Madhya Pradesh, India – Inception: 1981 – Elevation: 384 m – Local dialing code: 7580 Source: Office of the Registrar General and Census Commissioner (web), Delimitation Commission of India (web), Rand McNally International Atlas 1994, School of Planning & Architecture (web). Explanation: Districts, cities and towns in the boundaries of 2011.				

Table 2 Further information about the population of project influenced area

Gender	Persons	Percentage
Gender (C 2011)		
Males	33,577	52%
Females	30,952	48%
Urbanization	Persons	Percentage
	64,529	100%
Population Group	Persons	Percentage
Scheduled Castes	14,438	22.37
Scheduled Tribes	587	0.0091
Not Indigenous	49,504	76.716
Literacy	Persons	Percentage
Yes	50,173	77.75
No	6,255	9.69
Not Answered	8101	12.56

Table 3 Activity status of the project influenced area

Activity Status (A7+) (C 2011)		
Activity Status (A7+)	Persons	
Usually Employed	17,809	27.6
Casually Employed	2,099	3.25
Not Employed	36,520	56.6
Not Found	8,101	12.55

3.4 BUSINESS AND ECONOMY IN BINA

One of the key features that helps the town in becoming a progressive city is the development in the field of business and industries which helps the city to shine and generate considerable profits both for it as well the state. One of the major industries operating in this area includes Bharat Oman Refineries Ltd or BORL which is a combined venture of Oman Oil Company S.A.O.C and Bharat Petroleum Corporation Limited. It is the only oil refinery operating in Central India. The company BORL has set up in total of six MMTPA grass root refineries in the city premises. The oil refinery is designed with state-of-the-art technologies which enables it to produce various types of Middle East crude.

3.5 INFRASTRUCTURE

Infrastructure refers to the basic infrastructure and systems that serve a country, city, or territory, including the services and facilities required for the economy to function. Roads, bridges, tunnels, water supply, sewers, electrical grids, and telecommunications are examples of technical structures that provide essential commodities and services to society. A discussion of infrastructural development must recognize: (1) the regional specialization of the State's economy and thus of the space that is possible and desirable for the region in question; and (2) the level of overall economic development as indicated by the per capita income GDP and assess whether infrastructural services, such as those that are final Consumption goods: drinking water, municipal infrastructure, roadsServices and suchlike areadequate. It would also have to identify the steps needed to ensure adequate infrastructure development.

CHAPTER-4

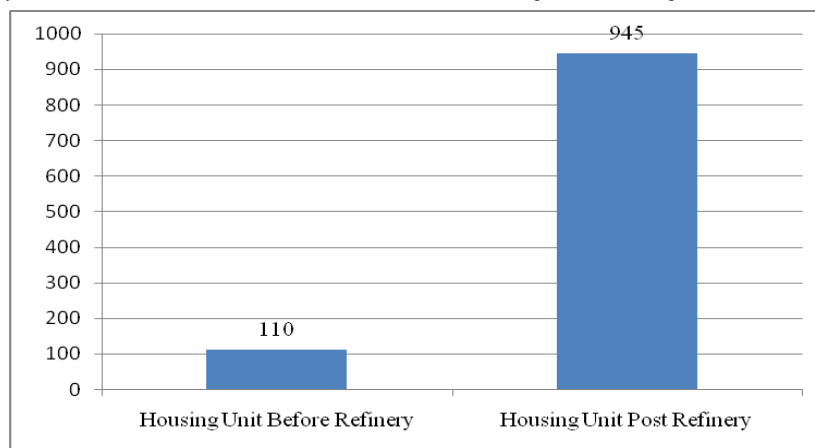
RESULTS, DISCUSSION, AND CONCLUSION**4.1 GENERAL**

The Bharat Oman Refineries Limited is contributing to significantly boosting the local economy by creating a large number of direct and indirect jobs during construction and post-commissioning, resulting in increased income and spending in the area, as well as stimulating the development of ancillary industries and infrastructure surrounding the refinery site; however, concerns about potential environmental impacts must be addressed.

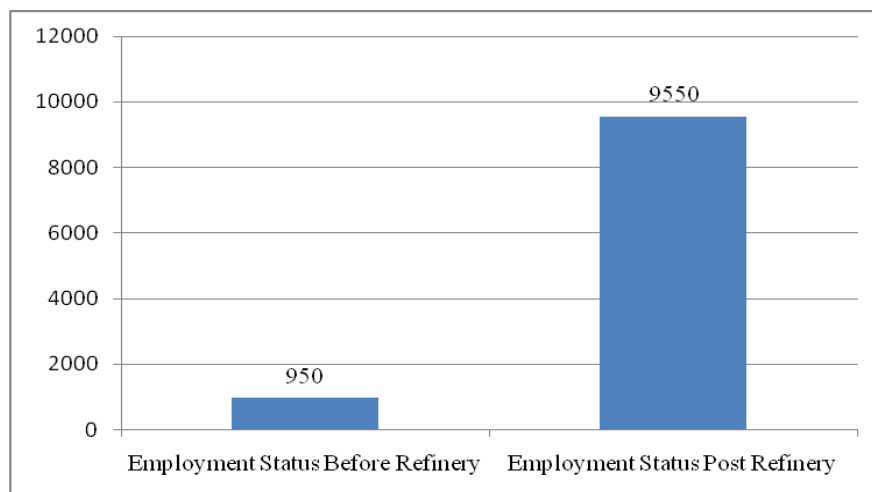
4.2 GROWTH IN HOUSING

With reports of land values rising significantly due to the influx of workers needed for construction and the overall economic boost provided by the project, there will likely be a significant increase in housing demand and prices in the Bina area following the Bharat Oman Refineries Limited expansion project. This is expected to result in increased housing development and higher rental rates for residents, which is seen as a positive outcome for the local economy, creating new opportunities for housing development and related businesses.

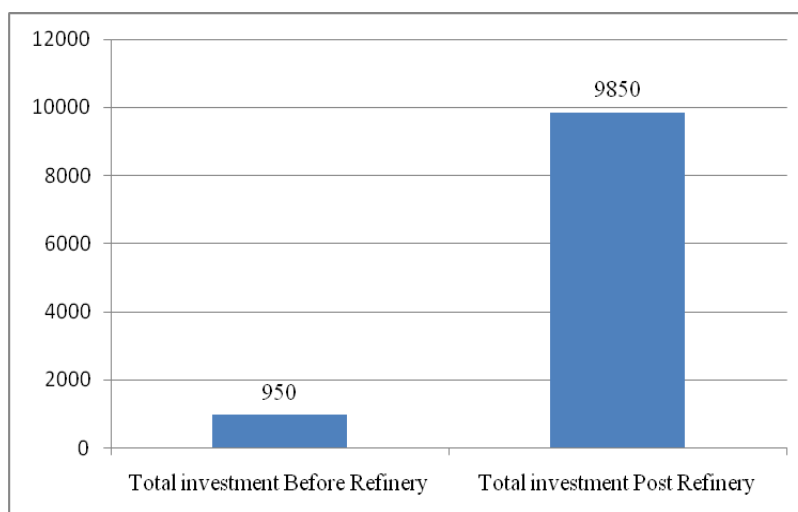
Large-scale housing unit building has taken place since the Bharat Oman Refineries Limited was established. Following the establishment of the refinery, 945 dwelling units were built throughout nearby communities of Agasod Bina. There were just 110 residential units before the refinery. 9,550 individuals in all were engaged in the building of the homes following the refinery's establishment, as opposed to just 950 before. Compared to Rs. 685 Lakhs before the refinery was established, Rs. 9850 Lakhs was invested in the building of the dwelling units.



Graph 1 Status of Housing Units before and after Setting up of the Refinery



Graph 2 Status of Employment Generated during Construction of Housing Units before and after Setting up of the Refinery

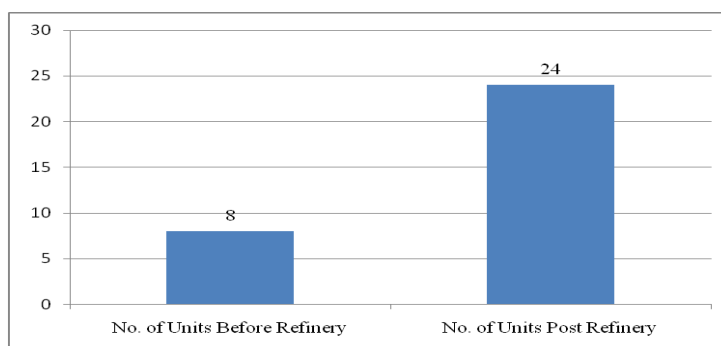


Graph 3 Status of Investments made during the Construction of Housing Units before

4.3 GROWTH IN HEALTHCARE AND RELATED SERVICES

An aging population, rising disposable income, the prevalence of chronic diseases, technological advancements, and growing investments in private healthcare facilities are all contributing factors to the significant growth of the healthcare and related services sector worldwide. This is especially true in countries like India, where it is expected to reach a value of over \$610 billion by 2026. Hospitals, medical devices, telemedicine, and medical tourism are among the key areas of growth, which are being driven by both government and private initiatives to improve healthcare access and quality. 24 clinics and medical stores were established upon the Refinery's founding, compared to just 8 previously. Following the refinery, 48 individuals worked to provide this service, and Rs. 51.2 lakhs were spent to establish these clinics and medical

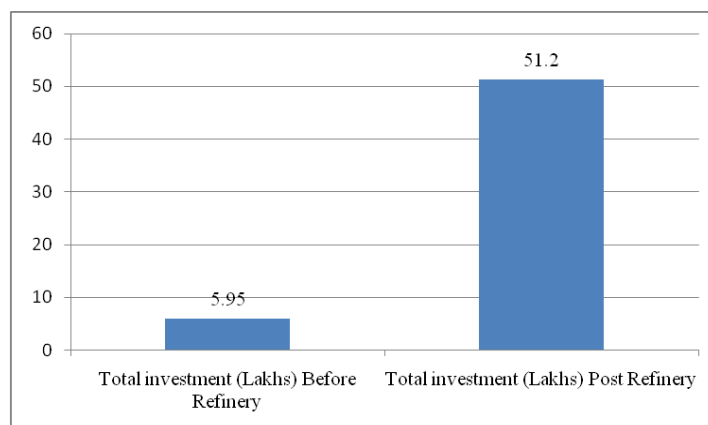
stores. Only 16 individuals were engaged in this service before the Refinery, and the establishment of the clinics and medical stores cost just Rs. 5.95 lakhs.



Graph 4 Status of Health and related Services before and after Setting up of the Refinery



Graph 5 Status of Employment Generated by Health and related Services before and after Setting up of the Refinery

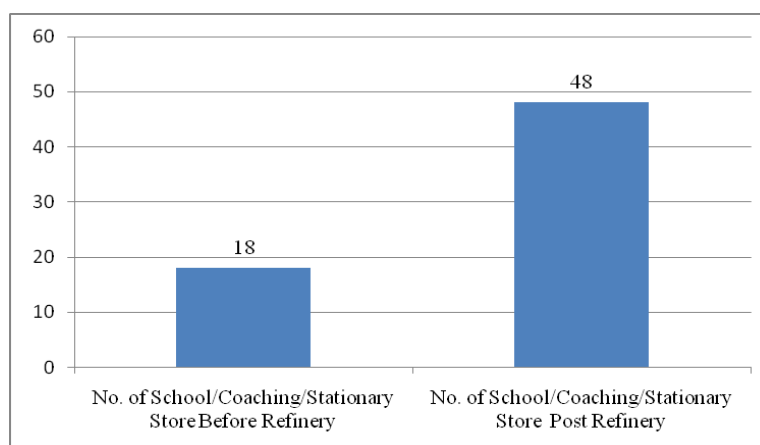


Graph 6 Status of Investments made during the Construction of Housing Units before refinery setup

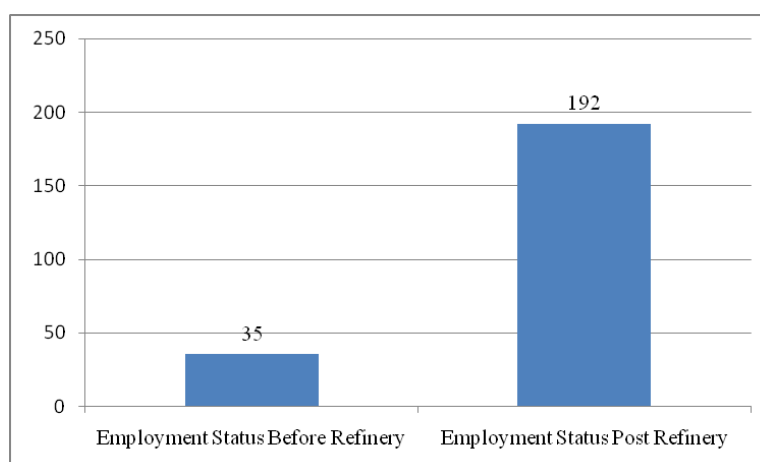
4.4 GROWTH IN EDUCATION SECTOR

Increased enrolment, higher literacy rates, and greater investment in digital education are just a few of the notable developments in India's education sector in recent years.

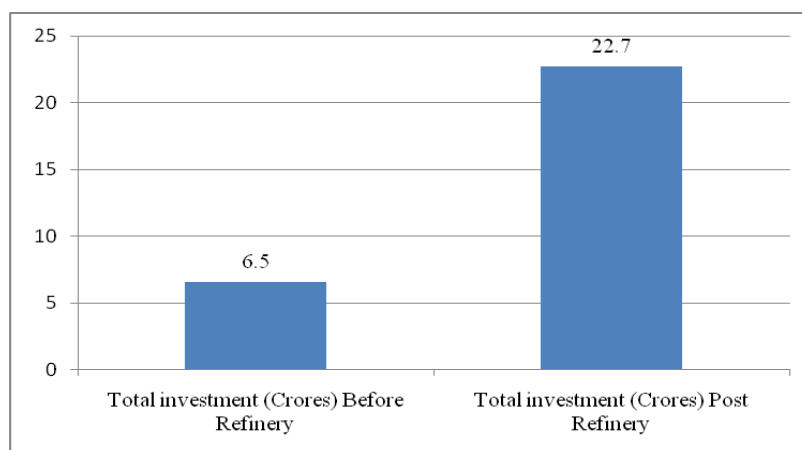
The educational service providers in the nearby villages improved once the Refinery was established. 48 schools, stationery stores, and coaching centres were established following the Refinery's opening, employing 192 people. Additionally, an investment of Rs. 22.7 Crores was made on the same. There were just 18 schools, stationery stores, and coaching centres before the Refinery, and 35 employees were working there. Before the refinery was built, hardly Rs. 6.5 Crores had been spent on its infrastructure.



Graph 7 Status of Educational Service Providers before and after Setting up of the Refinery



Graph 8 Status of Employment Generated through Educational Services Providers before and after Setting up of the Refinery



Graph 9 Status of Investment made by Educational Services Providers before and after Setting up of the Refinery (Rs. In Crores)

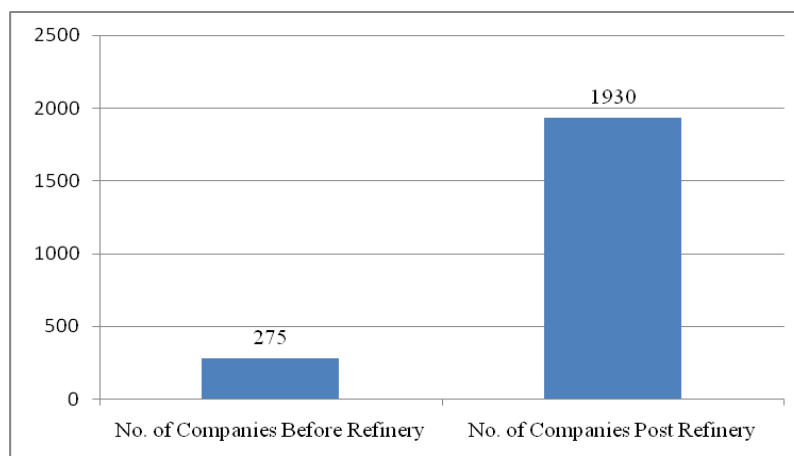


Figure 2 Renovation work at School by BORL

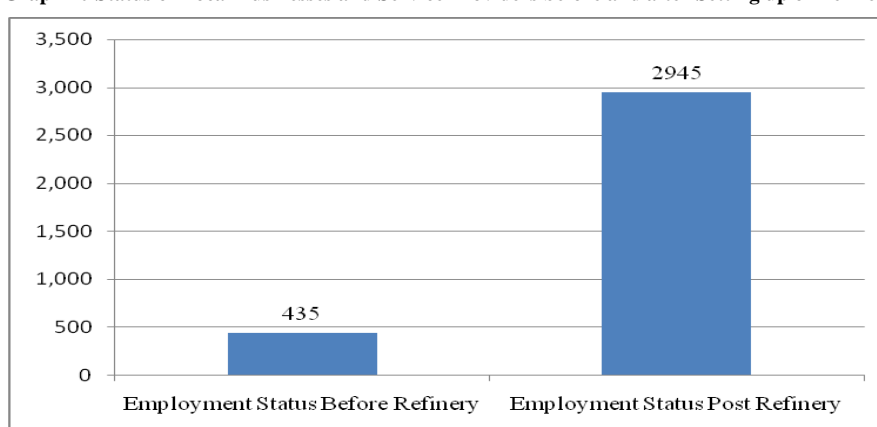
4.5 GROWTH IN LOCAL BUSINESSES

"Growth in local businesses" refers to the process of a small business operating within a specific community expanding its operations, typically measured by increases in revenue, customer base, market share, or employee count, achieved through strategies tailored to the local market and customer needs.

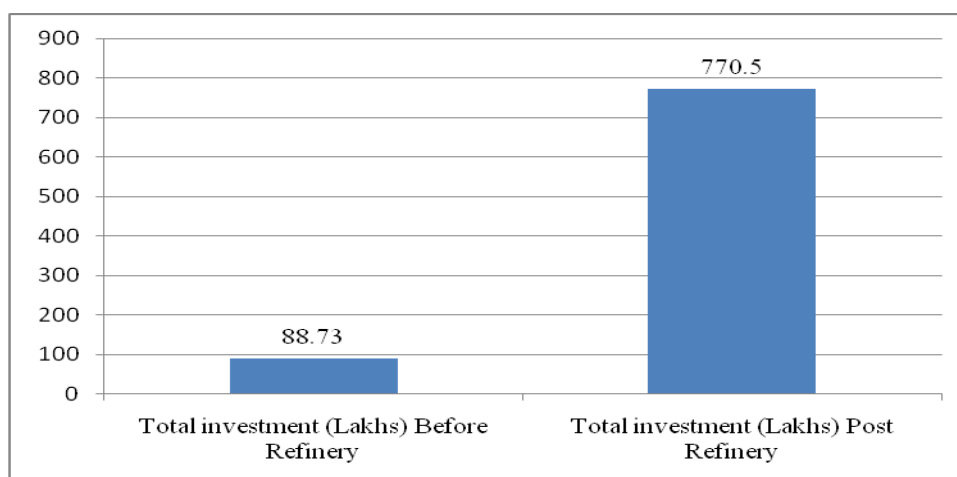
With the establishment of the Refinery, 2,945 people were employed by 1,930 local companies and service providers that established shops in Bina City and nearby villages. These included petty shops, courier services, electricians, decorators, tailors, maids, and more. A total of Rs. 770.5 Lakhs was earned by these service providers. There were only 275 of these neighborhood companies and service providers before the refinery, employing 435 people. The total amount spent on these services was just Rs. 88.73 lakhs.



Graph 10 Status of Local Businesses and Service Providers before and after Setting up of Refinery



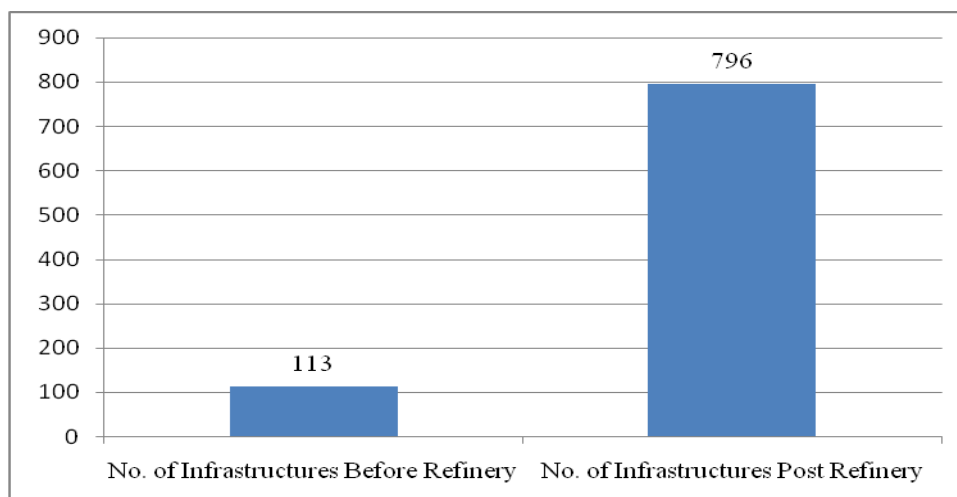
Graph 11 Status of Employment Generated by Local Businesses and Service Providers before and after Setting up of Refinery



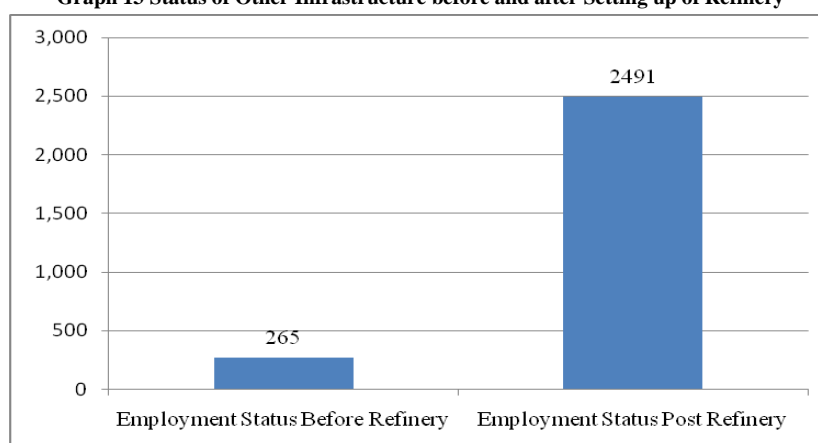
Graph 12 Status of Investment made by Local Businesses and Service Providers before and after Setting up of Refinery (Rs. in lakhs)

5.6 GROWTH IN OTHER INFRASTRUCTURE

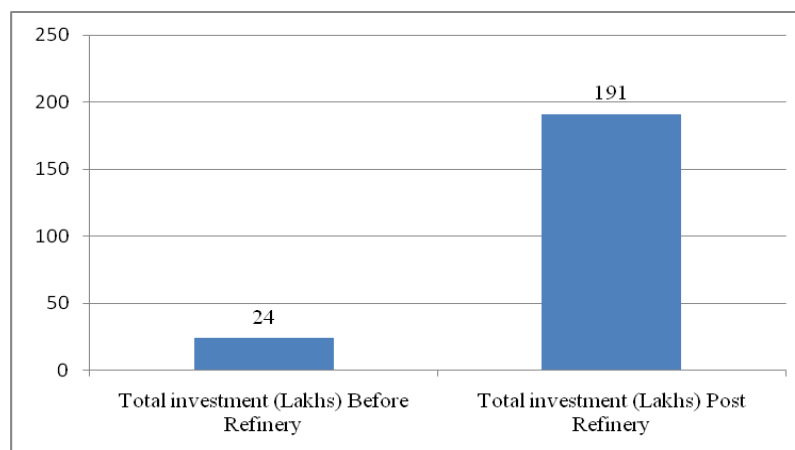
Following the refinery's establishment, the surrounding towns saw a boom in the number of people offering engineering and construction services, including blacksmiths, bar benders, carpenters, masons, suppliers of building supplies, and construction contractors, among others. Following the Refinery's creation, 796 of these service providers appeared in the communities, providing a living for 2,491 people. These service providers invested a total of Rs. 1.91 crore. There were only 113 of these providers before the refinery, and 265 people made their living from them. During this time, these service providers only invested Rs. 24 lakhs.



Graph 13 Status of Other Infrastructure before and after Setting up of Refinery

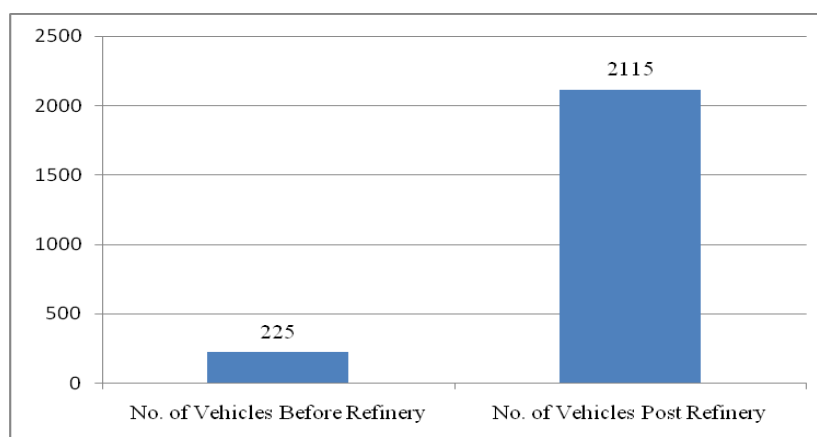


Graph 14 Status of Employment Generated through Other Infrastructure before and after Setting up of Refinery

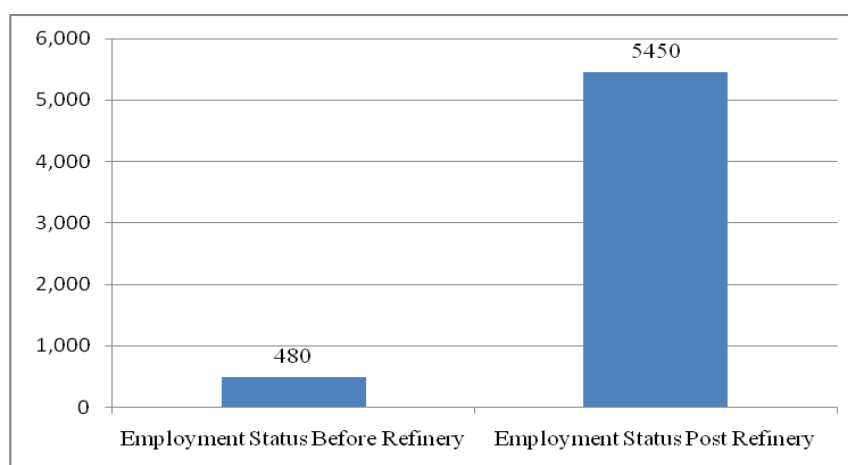


Graph 15 Status of Investment done through Other Infrastructure before and after Setting up of Refinery (Rs. in lakhs)

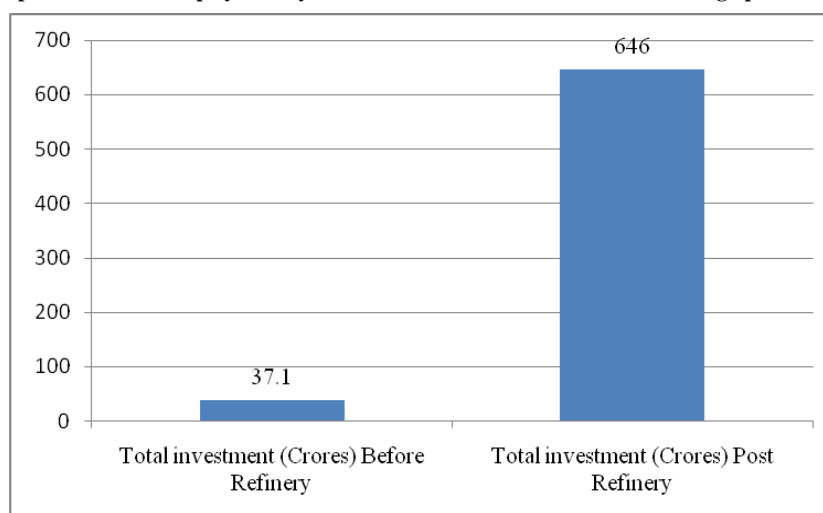
Other infrastructure, such as cars, JCBs, and trailers, increased in tandem with the building of the refinery. At an investment of Rs. 646crores, 2,115 of these vehicles, JCBs, and trailers were bought for the communities, creating 5450 jobs. The Refinery was preceded by Just 480 persons employed by the 225 such vehicle facilities that were acquired for a total cost of Rs. 37.1 crore.



Graph 16 Status of the vehicle and Other Infrastructure Before and after the establishment of the Refinery



Graph 17 Status of Employment by Other Infrastructure before and after Setting up of Refinery

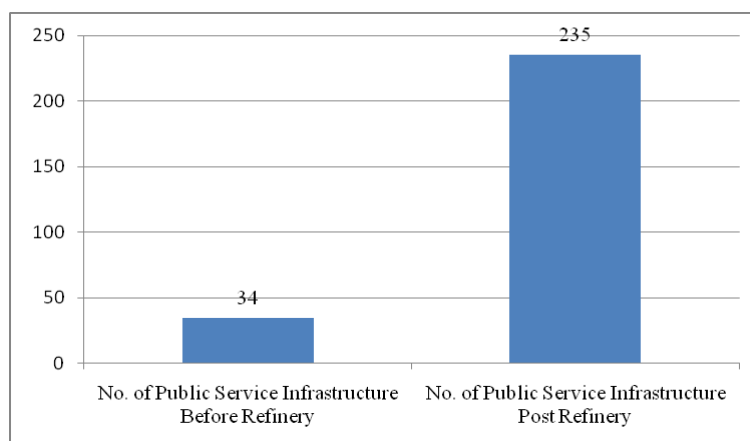


Graph 18 Status of Investment made by Other Infrastructure before and after Setting up of Refinery (Rs. in lakhs)

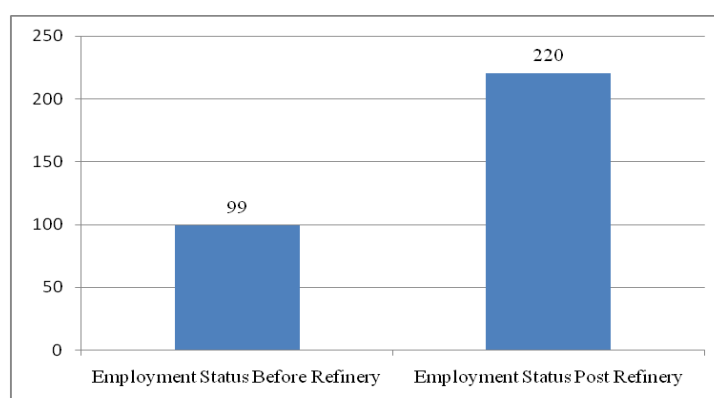
4.7 GROWTH IN PUBLIC SERVICE INFRASTRUCTURE

To improve the quality of life and economic development of a region or nation, the government invests in building and upgrading infrastructure. This includes projects like building new roads, expanding power plants, developing smart grids, and improving digital connectivity across communities. "Growth in public service infrastructure" refers to the expansion and improvement of essential public services like transportation, water supply, sanitation, electricity grids, and digital network

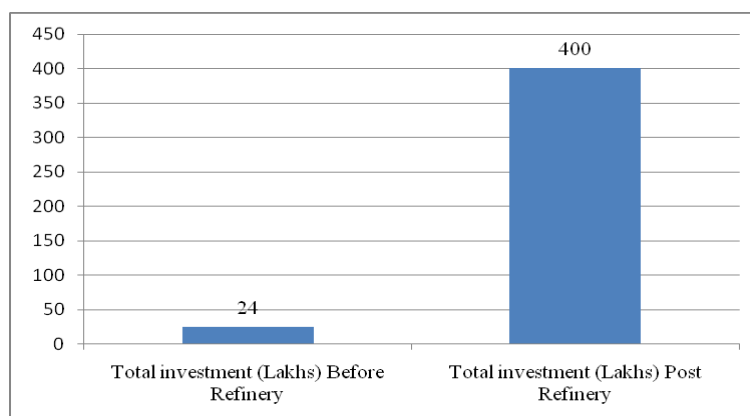
At a cost of around Rs. 4 crores, 235 public service infrastructure facilities, such as banks, conference centers, post offices, ration stores, and more, were established with the Refinery, creating jobs for 220 people. There were just 34 before the Refinery. These public service infrastructure facilities, which employ 99 people, were developed at Rs. 24 lakhs.



Graph 19 Status of Public Service Infrastructure before and after Setting up of Refinery



Graph 20 Status of Employment by Public Service Infrastructure Before and after Setting up of Refinery



Graph 21 Status of Investment made by Public Service Infrastructure before and after Setting up of Refinery (Rs. in lakhs)

4.8 CONCLUSION

Bina, a developing city in Madhya Pradesh was selected for the establishment of BORL. Here, the establishment of BORL has resulted in the significant social and economic development of the city. The study aimed to analyze the growth in the past decade after BORL's establishment. The study involved Cost-benefit analysis and financial analysis methods to measure the benefit to the society. Post BORL establishment, the city has observed development in various sectors like healthcare, literacy, urbanization, employment, etc. The city has observed substantial growth in housing development where there were near about 110 residential units before the refinery, it has increased to 945 units. Post BORL set up, 24 clinics and medical stores have also been established with an investment of 51.2 lakhs. For literacy, the number of educational institutes has also increased from 18 (before) to 48 (after) with an investment of 22.7 crores. Local business has also boomed and 1930 number of local companies/service providers have

established shops in the city. Growth in other infrastructure has been observed with an investment of 1.91 crores. This all has overall contributed tremendously in generating employment in the city post-setting up of the refinery.

CHAPTER-5

RECOMMENDATION FOR FUTURE WORK

Here are some prospective study topics in the field of oil refinery.

1. Carbon Capture and Utilization: Investigate technology for capturing and converting CO₂ into useful chemicals or fuels.
2. Waste Reduction and Management: Look into ways to reduce waste generation, recycle resources, and develop sustainable waste management procedures.
3. Biodegradable Lubricants: Create biodegradable lubricants using renewable resources to reduce environmental effects.
4. Biofuels and Renewable Fuels: Investigate the development of biofuels, renewable diesel, and other alternative fuels using biomass or waste materials.
5. Lubricant Base Oil Upgrading: Look into novel technologies for upgrading lubricant base oils, boosting their performance and sustainability.
6. Petrochemicals from Renewable Sources: Create procedures for producing petrochemicals from renewable resources, such as biomass or waste plastic.
7. Circular Economy in Oil Refining: Create methods for implementing circular economy concepts in oil refining, with a focus on waste reduction, recycling, and reuse.

REFERENCES

1. Adeyemi O.T. (2004); "Oil Exploration and Environmental Degradation: The Nigerian Experience", Environmental Informatic Archives, Vol. 2, pp. 389-93.
2. Ameer H. Al-Rubaye, Dheyaa J. Jasim, Safiyya A. Jassam, Hayder M. Jasim, Hawzhen Fateh M. Ameen and Hazim Aziz Al-Robai (2023); "The Side Effect of Oil Refineries on Environment: As a mini Review", IOP Conf. Series: Earth and Environmental Science, Vol. 1262, pp. 022024.
3. Asian Development Bank (2011); "Economic Analysis, National Grid Improvement Project, RRP IND 44426 and 44917".
4. Accessed from <http://www2.adb.org/Documents/RP/IND/44426/44426-014-ind-ea.pdf>.
5. Alexander K., Alexander G., Margarita R., and Rufina K. (2012); "Contamination of geological environment (ground waters) by toxic oil products", Ohrid, Repub. Macedonia, pp. 1-12.
6. Atubi A. O. (2011); "Effect of Warri refinery effluents on water quality from the Iffie river, Delta state, Nigeria", Am. Rev. Polit. Econ., pp. 45-56.
7. Bureau of Indian Standards (1983); "Report, Bureau of Indian Standard, Indian Standards Specification for drinking water IS: 10500, New Delhi".
8. Dubey S. K., Yadav R., Chaturvedi R. K., Yadav R. K., Sharma V. K., and Minhas P. S. (2010); "Contamination of ground water as a consequence of land disposal of dye waste mixed sewage effluents: a case study of Panipat district of Haryana, India", Bull. Environ. Cont. & Toxic., Vol. 85 Issue 3, pp. 295-300.
9. Singare, Pravin; Mishra, Ravindra; Trivedi, Manisha (2012); "Sediment Contamination Due to Toxic Heavy Metals in Mithi River of Mumbai", Advances in Analytical Chemistry; Vol. 2 Issue 3, pp. 14-24.
10. Chawla Krishan (1987); "Social Cost-Benefit Analysis: An Introduction to Financial and Economic Appraisal of Projects", Mittal Publishers, ISBN 9788170990222.
11. Chin-Yu Hsu, Yu-Tzu Chang, Cheng-Ju Lin (2022); "How a winding-down oil refinery park impacts air quality nearby?", [Environment International](#), Vol. 169, pp. 107533.
12. Dinara Millington, Rob McWhinney, Zoey Walden (2014); "Refining Bitumen: Costs, Benefits and Analysis", Study No. 145, Canadian Energy Research Institute (CERI).
13. Dupuit, A.J. (1844); "On the measurement of the utility of public works", International Economic Papers, Vol. 2, pp. 1952.
14. Flyvbjerg B., Bruzelius N., Rothengatter, W. (2003); "Megaprojects and risk: an anatomy of ambition", Cambridge: Cambridge University Press.
15. Khatik J. and Kathal P. K. (2017); "Physical and geochemical parameters of surface water bodies around the oil refinery at Bina, Sagar district, Central India", Curr. Sci. Vol. 113 Issue 7, pp. 1230-1232.
16. Machender G., Dhakate R., Mallikharjuna Rao S.T., Rao, B.M. and Prasanna L. (2014); "Heavy metal contamination in sediments of Balanagar industrial area, Hyderabad, Andhra Pradesh, India", Arab. Jour of Geosci., Vol. 7, pp. 513-525.
17. Marshall Goldberg (2013); "Petroleum Refinery Jobs and Economic Development Impact (JEDI) Model User Reference Guide", National Renewable Energy Laboratory (NREL), Subcontract Report NREL/SR-6A20-60657, U.S. Department of Energy Office of Energy Efficiency & Renewable Energy, Alliance for Sustainable Energy, LLC.
18. Mishan E.J., and Quah E. (2007); "Cost-benefit analysis", (5th ed). New York: Routledge.
19. Munger M. (2000); "Analyzing policy: choices, conflicts and practices", New York: W.W. Norton.
20. Nash C.A. (1991); "The case for high speed rail, Institute of Transport Studies", University of Leeds. Working Paper, pp. 323.

21. Ninan K. N. (2008); "Cost-benefit analysis: An introduction", Santa Barbara: Donald Bren School of Environmental Science and Management, University of California.
22. OECD (1969); "Manual of industrial project analysis", Volume II. Social cost-benefit analysis, Paris: OECD.
23. Oyinkepreye Lucky Bebetidoh, Simon Kometa, Kayvan Pazouki, Rose Norman(2020); "Sustained impact of the activities of local crude oil refiners on their host communities in Nigeria", Heliyon ScienceDirect, pp. 1-9.
24. [Vijendra Singh](#) and [C P Singh Chandel](#)(2006); "Analytical study of heavy metals of industrial effluents at Jaipur, Rajasthan (India)", J Environ Sci Eng. Vol. 48 Issue 2, pp.103-108.
25. Singare P. U., Mishra M., and Trivedi P. (2012); "Sediment contamination due to toxic heavy metals in Mithi river of Mumbai", Adv. Analyt. Chem., Vol. 2 Issue 3, pp.14-24.
26. Suleimanov A. Y. (1995); "Conditions of waste fluid accumulation at petrochemical and processing enterprise prevention of their harm to water bodies", Med. Truda PromysleNnaiaEkol., Vol.12, pp. 31–36.
27. United Nations Industrial Development Organization (1972); "Guidelines for project evaluation", New York: United Nations.
28. United States Environment Protection Agency (1986); "Report, U. S., Guidelines for the health risk assessment", EPA/630/R-98/03.
29. United States Geological Survey (2008); "Report, Anthropogenic organic compounds in source water of nine community water system that is withdrawn from streams, 2002–2005".
30. World Bank (1975); "Economic analysis of projects", Washington DC: World Bank.
31. World Health Organization (2006); "Guidelines for drinking water quality", first addendum to 3rd edition, Recommendation, Geneva, 595.
32. World Bank (2004); "Monitoring and evaluation: Some tools, methods and approaches", Washington DC: World Bank.
33. Youssef A. Haddad (2020); "The syntax of the addressee in imperatives: What Levantine Arabic attitude datives bring to the table", Proc Ling Soc Amer, Vol. 5 Issue 1, pp. 1–15.