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Ecological concerns and electoral politics in DMIC industrial corridor

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Abstract
DMIC (Delhi-Mumbai Industrial Corridor) is One of India's largest and most ambitious infrastructure projects. This industrial corridor has been designed to stimulate growth in the manufacturing sector, attract foreign investment and produce urbanisation along a 1,504 km corridor which connects the NCR and Mumbai. These highly anticipated economic benefits have ushered in a significant increase in population density, industrialisation and pollution in the DMIC region. However, this increase in population density and industrialisation has resulted in an increase in both air and water pollution, land-use changes and the depletion of natural resources. This paper explores how these emerging ecological concerns are related to the electoral process of the DMIC region by using a case study approach, which is populated with secondary data. To this end, pollution data (particularly the AQI) and industrial clustering have been correlated with the participation metrics of the Lok Sabha elections, including voter turnout from both 2014 and 2019. Quantitative analysis of the data has been conducted using descriptive statistics and correlation analysis, and in conjunction with the geographical/political context of the DMIC. we conclude that the association between industrialisation and pollution is a strong correlation; however, at present their respective direct influences on voter turnout are weak. Nevertheless, evidence exists to suggest that ecological concerns are starting to gain political weight in those districts which have experienced an increase in the level of industrialisation. This study suggests that ecological issues may soon become a significant aspect of electoral politics in industrial corridors; this has implications for sustainable development policy and democratic accountability in India.

Keywords: Delhi-mumbai industrial corridor, ecological concerns, electoral politics, industrialisation, pollution, voter turnout, sustainable development

Introduction

Over the past thirty years, many large infrastructural developments and industrial corridors have helped shape India's economic development. The DMIC is one of these many Projects. The Delhi-Mumbai Industrial Corridor (DMIC) is India's First Industrial Corridor. It is being developed by India's government and runs alongside the Western Dedicated Freight Corridor (DFC). The length of the DMIC is 1,504 km, starting at Dadri (in the National Capital Region) and ending at the Jawaharlal Nehru Port Trust near Mumbai. The DMIC runs through Uttar Pradesh, Haryana, Rajasthan, Madhya Pradesh, Gujarat, and Maharashtra. Many of the areas the DMIC passes through are both highly populated and very economically productive. Many of the areas have also experienced significant environmental stresses.

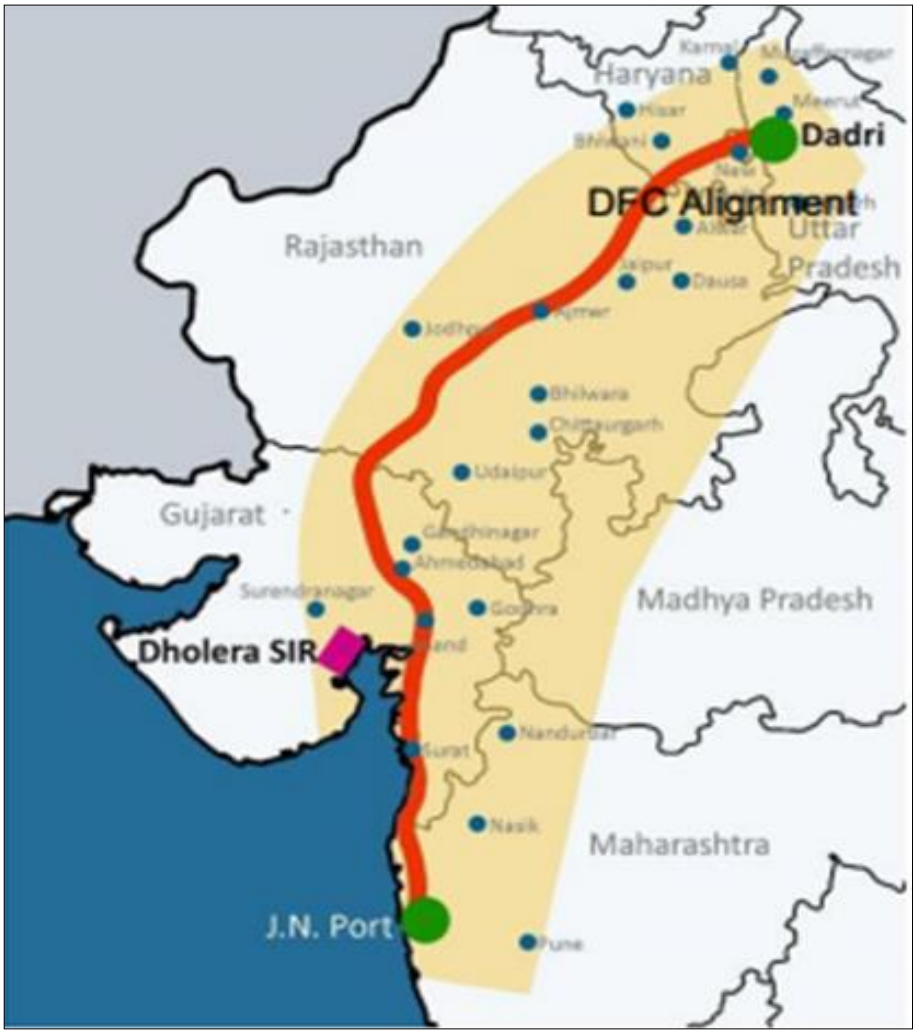
The DMIC is an internationally renowned, superior manufacturing centre, creating manufacture output through attraction of overseas investment, increasing export competitiveness, and increasing employment levels across the various sectors. According to published government plans, the DMIC regions comprised roughly 43 per cent of India's gross domestic product, over 50% total industrial output, and a large percentage of exports in mid 2000s. Projected annual numbers indicate that the corridor will have a manufacturing increase of up to 14x from 2010 through 2040 with dramatic increases in population and urban growth occurring during that time period. The above forecast will emphasize the large scale of the economic change that is about to occur in the DMIC regions.

The industrialisation of India has illustrated how rapid economic growth can take place with a great deal of environmental damage, as evidenced by many large urban and industrial centres within (e.g.) Delhi, Mumbai, and Ahmedabad, which consistently fall short of meeting the World Health Organisation's air quality guidelines. In addition, many of the emerging DMIC states face problems relating to water shortages, depletion of groundwater, industrial pollution (effluents), solid waste, etc. The official Perspective Plan for the DMIC states has recognised all of these issues and has called for environmentally sustainable development, preservation of air/water/soil quality and preservation of agricultural land.

The objective of this work is to evaluate how environmental issues impact votes cast in the DMIC area. In particular, we wish to determine if greater industrial polluting factors correlate with changes in voter participation rates within various communities, and then to use findings from this analysis to better understand how environmental problems become politicised within the developing areas of India. Through the evaluation of both environmental indicators and electoral statistics, this investigation will extend interdisciplinary conversations relating to political science, environment, and development planning.

Review of Literature

This literature review covers three areas that interrelated: (i) environmental assessments and planning processes for the Delhi-Mumbai Industrial Corridor (DMIC), (ii) India's environmental degradation and governance issues, and (iii) ecology-related issues relating to Indian electoral politics. The combination of these three areas serves as the foundation from which the relationship between ecological issues and the electoral process can be established through the analysis of large industrial corridors.



Source: Sharma, A., and Tomar, A.S. (2020) [11]. Opportunities and Challenges for the Development of Industrial Cities proposed in Industrial Corridors. A Case-DMIC Corridor, Phase 1. International Research Journal of Engineering and Technology. 7(9) 2885, Fig. 3.

Fig 1: Industrial regions and cities proposed on DMIC

1. Industrial corridor, urbanisation and environmental stress

The DMIC is defined by the primary framework of Official Policy Documents prepared by the Government of India and DMIC Development Corporation which set out the scale, objectives and impacts expected to be achieved by the DMIC. The Perspective Plan for the DMIC (Government of India 2016) [5] describes the DMIC as a growth engine for manufacturing, export and urbanisation using world-class infrastructure and integrated industrial townships. At the same time, the plan acknowledges that rapid industrialisation poses significant risk to the environment in the forms of air and water pollution; land-use change; pressure on groundwater resources; and threats to wildlife and biodiversity. The Executive Summary of the Final Plan Report further explains that past trends in urbanisation and industrial development have led to significant environmental degradation, therefore indicating that the DMIC will require a much higher level of environmental standards and site-specific demonstration of eco-development. (NICDC, 2025) [8].

Kaushik & Naval (2016) [7] situate Industrial Corridors in the context of developing the future of India as part of the overall future development strategy of India for managing rapid urban migration, improving productivity, and integrating cities in India into the global production network. Their analysis identifies opportunities (e.g., job creation, infrastructure and social development) as well as challenges (e.g., environmental impact, disparities in development and poor governance) and places a great deal of importance on Environmental Sustainability as a primary consideration, rather than an afterthought. The authors highlight that as mega-city growth & corridor-based industrialisation continue, they will continue to place increasing demands on Energy, Water and Land Resources, and Environmental Sustainability will naturally move from being an Afterthought, to being the Primary Concern.

On a broader scale, Doctoral Research conducted by Joshi (2024) [6], studies both the DMIC and Dholera Smart City, and provides evidence of Planetary Urbanisation and Post-liberalisation - Neo-liberal Development. Through a detailed analysis of land markets, SEZs and Socio-spatial transformation, it clearly illustrates that many large infrastructure projects favour economic efficiency over the social equity and environmental justice. This research was highly relevant to this research study, as it demonstrated how industrial corridors will have an enormous impact on reshaping the hinterlands and displacing vulnerable communities and creating new ecological vulnerability, thus providing a platform for political contestation.

Bathla (2024) [1] expand this critique by analysing how extended urbanisation occurs through highway corridors in

India. Bathla demonstrates the ways in which infrastructure corridors act as contested spaces that are filled with uncertainty, legal disputes, and competing claims on land and resources, using the Dwarka Expressway as the focus for the analysis. Although the study does not investigate the electoral behaviour of its subjects, it does, in turn, add to the body of knowledge on how corridor led development creates socio-environmental uncertainty that can affect the way citizens mobilise politically and perceive their government.

2. Environmental degradation and governance in India

Monitoring and governing the environment creates an empirical foundation for research analysing how industrialization affects politics. The Data collected by the Central Pollution Control Board (2019) [3] show that areas of extreme air pollution exist in most of the urban and industrial locations of the DMIC states. Most of these areas are consistently above the air quality standards set by both the national government and the World Health Organisation. This finding demonstrates how industrialisation and increased use of transportation along the DMIC will affect public health. An analysis by Ranjan (2024) [1] of environmental politics between 2014 [10]-2019 has provided a framework through which we can connect ecological issues to the governance model and thereby to political decision-making by the government. Ranjan's research has critically assessed the various policy changes made by the Modi government, outlining the contradiction that existed between government imperatives to promote economic growth and the need to protect the environment. Some of the initiatives to develop climate infrastructure created opportunities for greater climate infrastructure development but at the same time allowed for many of the regulatory relaxations and clearance processes that resulted in widespread public protests and opposition from civil society. Therefore, Ranjan concludes that environmental governance was centralised in that, under the Modi government between 2014-2019 [3, 10], there was little to no tolerance for dissent and, thus, environmental concerns, when related to electoral politics, shaped the political context where those ecological issues could, or could not, translate into electoral issues.

3. Ecology and Electoral politics in India

The study of the relationship between the environment and electoral politics in India has not been explored in as much detail as other aspects of electoral politics. Trivedi analysis found that green issues were often included as an afterthought within Indian electoral campaigns as well as the party manifestos. One reason the study concluded that green issues do not play a important role in deciding who will win an election is due to the primacy of short-term economic and welfare issues over other considerations (e.g., climatic changes). Bandyopadhyay's (2025) [2] structural critique shows how deeply embedded environmental neglect is in the mainstream ideology of development held by virtually every Indian political party - development equates to extraction and industry. From this view, environmental destruction occurs not simply due to voter disinterest/unconcern, but because political parties function within a corporate-led democratic system that removes ecological issues from consideration. This argument applies most strongly to industrial corridors like the DMIC, where the interests of the state-and-the-people converge with the interests of private investment.

The electoral datasets created by the Election Commission of India in 2014 and 2019 [3, 4] supply the empirical basis to assess whether environmental stress correlates with political activity or participation. Although the current literature does not demonstrate any link between pollution levels and voter turnout within India on the basis of an established cause-and-effect relationship, the growing body of research indicates that environmental concerns may serve as latent political variables; this means that these concerns have a greater impact on shaping public opinion and political action over time than immediate voting behaviour.

Methodology

This research utilizes a case study method analyzing the Delhi - Mumbai Industrial Corridor. All methodologies were based on secondary data obtained from publicly accessible sources (i.e., documents) and thereby provide a level of transparency, which supports the ability of this study to be replicated. Environmental data (i.e., proxied as average Air Quality Index (AQI) values), environmental data were measured using the average AQI for each of the states that make up the DMIC (Delhi-Mumbai Industrial Corridor) as evidenced and recorded in the reports of the Central Pollution Control Board and the associated datasets produced by the governments of these states. Industrial intensity is quantified by the number of large industrial clusters and nodes within the DMIC through the government's DMIC planning document.

Elections data drawn from the Election Commission of India and includes percentages of voter turnout based on each state in India from 2014 and 2019 [3, 4] Lok Sabha elections. While electoral data could also come from district level for a finer granularity of analysis, this study has used data aggregated at state level as it is more consistent between datasets and allows for observation of larger regional trends across the two elections.

The analytical strategy uses the combination of descriptive statistics and simple correlation analysis to understand how pollution levels are connected to the amount that industries cluster together, and also their impact on local voter turnout. The goal is not to make a causal statement about the effect of polluting industries on voter turnout, but to provide data for future researchers to investigate. Various visualization tools will be utilized to improve interpretation, including trend graphs and scatterplots. In addition, the research incorporates a spatial aspect by developing a conceptual GIS-style map displaying the geographic distribution of pollution stress zones and DMIC nodes that are based on both official DMIC corridor maps and environmental assessments of pollution stress zones.

There are some Limitation regarding the Methodological Approach. First, instead of using Continuous data to Quantify Levels of Pollution as a measurement method, we only used indicators of Pollution. This leads to less accuracy in the results and findings of our research. Second, there are numerous Sociopolitical Variables that have not been accounted for; however, we are aware of these limitations and will be interpreting our findings as such.

The DMIC as a Case Study

The DMIC region contains a very diverse collection of socio-economic landscapes. The DMIC includes urbanised

areas like Delhi and Mumbai, industrial areas of Gujarat and western Maharashtra, agricultural areas of Haryana and western Uttar Pradesh, arid and semi-arid areas in Rajasthan, and an industrial plateau in western Madhya Pradesh. According to the Census 2001 data, the DMIC represented about 19.4 per cent of India's population but made up only about 15.6 per cent of the nation's land area.

This corridor consists of several investment corridors and industrial development areas at different stages of development. The Dholera Special Investment Region is located in Gujarat, while the Shendra–Bidkin Industrial Area is located near Aurangabad. There are also Integrated Industrial Townships located at Greater Noida and Vikram Udyogpuri, and there are numerous industrial nodes located in both Rajasthan and Haryana. Each of these investment corridors contains a diverse mix of industries, including automobile manufacturing and components, chemical and petrochemical products, cement, textile products, engineering goods, food processing products, and IT service providers.

The government projects the DMIC area to see job growth from 3.4 million jobs today to about 29 million jobs by 2040. In addition to job growth, there is going to be increased population through migration and an increase in the land area of towns and cities in the corridor. And with this growth come many environmental challenges such as lack of adequate surface water, excessive groundwater use, deteriorating air quality, and the inability to properly treat and dispose of all waste will create problems that will impact future generations living and working within the DMIC region. All states in DMIC should also consider the impact of the environment on their political agendas.

Result and Analysis

Inter-State Variation in Air Quality, Industrialization, and Voter Turnout (2014–2019) [3]

The comparative analysis of air quality, industrial presence, and electoral participation across selected Indian states reveals notable inter-state variation. Maharashtra had the best average Air Quality Index (AQI) of 215, and the greatest number of industrial clusters (n = 11), whereas Madhya Pradesh had the lowest average Air Quality Index (170) and the minimal number of industrial clusters (n = 5). Relatively high levels of AQI (210 and 205) were also observed in Haryana and Gujarat, with large industrial concentrations. On the other hand, Rajasthan and Madhya Pradesh exhibited relatively low values of AQI and a number of industrial clusters. The general increase in voter turnout showed that most states had already seen an increase in voter turnout between the 2014 [10] and 2019 general elections. The state of Haryana had the highest electoral turnout with rates increasing to 74.1 percent in 2019 with an increase in 2014. Rajasthan and Madhya Pradesh had significant changes in voter turnout as it rose to 63.1 to 66.7 percent and 65.2 to 68.5 percent, respectively. Gujarat was also among the moderate increases in participation with 64 percent in 2014 to 67.4 percent in 2019. The turnout in Uttar Pradesh was always lower, showing only a low improvement in the number of 58.3 percent to 59.2 percent in the same period. Conversely, the state of Maharashtra experienced a comparative stability in voters turnout with the turnout relative to both years of elections being at 61 per cent. Overall, the results indicate heterogeneous patterns in air quality and industrialization across states, alongside a general trend of increased voter participation between 2014 [10] and 2019, though the magnitude of change varied considerably by state (CPCB, 2019; Election Commission of India [ECI], 2014; Election Commission of India [ECI], 2019) [4, 3].

2. Pollution and voter Turnout

Fig. 1 illustrates the relationship between average air quality index (AQI) and voter turnout during the 2019 [3] Lok Sabha election. The scatter plot indicated a modest negative correlation; the greater the pollution levels did not mean higher or lower turnout rates for elections. Therefore, as per this study, environmental pressures are currently not a strong enough reason to either galvanize or demobilize the electorate in any given area of India.

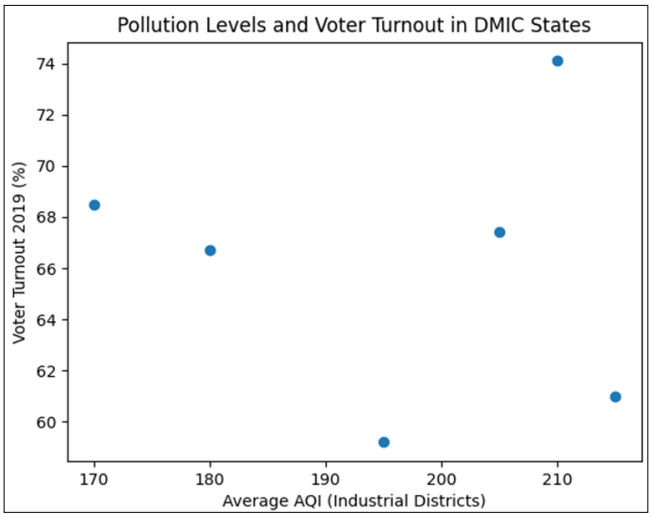


Fig 1: Average AQI vs Voter Turnout (2019)

3. Trends over Election year

A consistent increase in AQI levels is observed across all states over the study period, indicating a general deterioration in air quality between the two election cycles. In both years, Maharashtra registered the best AQI values that went up to about 200 in 2014 and 215 in 2019. The levels of pollution were relatively high in Haryana and Gujarat, where AQI of Haryana grew between approximately 195 and 210 and Gujarat between approximately 190 and 205 during the same time. These states show a strong increase in the AQI, which indicates the increased pressure on the environment in the most industrialized areas. By comparison, AQI values in Rajasthan and Madhya Pradesh were lower, but both states had significant increases. The AQI of Rajasthan increase was approximately 165 in 2014, and 180 in 2019, and the Madhya Pradesh rose to about 160 and 170 respectively. Uttar Pradesh was somewhere in the middle category, with the AQI levels growing between 180 and 195 between the two years of the elections. Generally, the findings indicate that air pollution is increasing with a consistent pace in all DMIC states in 2014-2019 with varying levels of increase among the states. This trend highlights the escalating environmental issues linked with the industrial growth in the area throughout the research time.

4. Correlation Analysis

According to Table 2, correlation coefficients were computed to show how average AQIs, industrial clusters

and the voter turnout in 2019 correlate with each other. The correlation between industrial clustering and AQI is a strong positive correlation, which suggests that the environment has a burdened cost due to the concentration of industries in an area. On the other hand, the AQI to voter turnout has a weak correlation, while the correlation from the industrial clustering to voter turnout is a moderately negative correlation. These results support the hypothesis that industrialization may influence how much people turn out to vote; however, it is more likely due to an indirect effect of socio-economic and urban governance, than an individual's awareness of their environment.

Table 2: Correlation Matrix

Variables	Average AQI	Industrial Clusters	Voter Turnout 2019
Average AQI	1	0.848326	-0.08003
Industrial Clusters	0.848326	1	-0.58032
Voter Turnout 2019	-0.08003	-0.58032	1

Discussion

The results of this study indicate that ecological concerns have not yet been established as a primary motivation for voting in the DMIC region. Although the level of pollution has increased and the population of the area experiences many types of environmental stress, voting behaviour is still primarily influenced by traditionally political and socio-economic factors. This finding is consistent with previous research, which describes the issue of environmental sustainability in India as a lower priority compared to other pressing livelihood and welfare needs. However, the results indicate that ecology has become a political issue. The moderate association found between industrialization and reduced voter turnout could reflect a feeling of disenfranchisement among people living in areas with a large industrial base, where environmental problems are often overlooked or not addressed by political institutions. As people's awareness of health risks from environmental factors grows, and as environmental groups gain more visibility, ecological issues may become more important to voters in the years ahead.

Conclusion and Policy Implication

This paper examined the relationship between environmental issues and political elections through the case study using secondary data and quantitative analysis of the Delhi-Mumbai Industrial Corridor (DMIC). It has been found that although there is a significant relationship between industrialisation and pollution, the individual impact of both on voting turnout will still be very minimal. Nonetheless, the environmental issues currently affecting the DMIC region highlight how important it is to include some level of ecological responsibility in both future development and democratic governance. From a policy perspective, the finding underscore the significance of transparent environmental impact assessment, enhanced pollution monitoring and citizen engagement in decision-making processes associated with industrial governance. Proactive response to ecological issues can alleviate potential sources of frustration in the future and build legitimacy for democratic processes within newly emerging industrialized nations. As the DMIC continues to be developed in India, it also provides valuable insight on managing economic growth while maintaining environmental integrity and ensuring electoral accountability.

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