

Infrastructure & Industrialization: An SDG-9 Study of Gujarat

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Abstract— The paper explores & provides a discussion-oriented overview regarding Sustainable Development Goal 9. SDG-9 talks about building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation. For the purposes of this study, Gujarat is considered the context, and we present data on progress of the state in this indicator regarding general patterns and policies across the state. Overall industrial development and infrastructure development in Gujarat has seen acceleration. The idea is to understand relevant factors encompassed under SDG-9. It was difficult however to obtain accurate state level data points, and thus the analysis remains a mix of conceptual presentation along with quantitative insights. The aim is to highlight potential areas for where action is required. Existing state of infrastructure & industries is majorly discussed.

Keywords: Sustainable Development, Industrialization, Innovation, Infrastructure policies

JEL Classification: O14, O18, O31, Q01

I. INTRODUCTION

Sustainable Development Goal 9 emphasizes the interconnected nature of economic growth, social progress, and climate resilience—anchored in the advancement of **infrastructure, industrialization, and innovation**. These three pillars are in fact very crucial to sustainable growth patterns. Infrastructure provides the foundation for all existing economic activities to flourish as well as attract newer investments. With appropriate amenities & infra-tech support, resources become more accessible. Industrialization or growth of the manufacturing segment, helps bring out better products in the market globally to potential capacity. As long as a country is innovative in its practices, and spends on Research & Development, it maintains an edge against others. It highlights the fact that development is not solely about building physical structures but about creating a dynamic ecosystem that stimulates economic progress, broadens employment opportunities, and upholds environmental responsibility.

As per the progress tracker from the SDG website, it is said that, globally, the share of manufacturing in total employment has declined over recent years, reflecting structural shifts in the global economy. Although strides have been made in reducing carbon dioxide intensity within the manufacturing sector, the current pace of change remains insufficient to meet the 2030 targets outlined under SDG 9. To accelerate progress, and make sure this deadline isn't missed out, there is a pressing need to fast-track the green transition, channel investment into strategically vital industrial sectors, and confront existing disparities in access to digital infrastructure and participation in innovation ecosystems. (UN SDG, 2024)

Infrastructure and industrial development have emerged as key drivers of regional competitiveness in India's rapidly growing economy. For Gujarat, the story is quite similar. The state has well-developed industrial sectors and an export-oriented manufacturing sector, but it also has some challenges and opportunities to embrace SDG 9, and help achievement of this goal nationally. Recent performance in sectors such as manufacturing, logistics and power supply have shown that Gujarat's strategic advantages can help India realize this dream faster in this globalized world economy. However, to sustain this growth in the future will require continued investment, and to focus on improving the innovation capacity, addressing the disparity between leading and lagging regions, and developing flexibility to external shocks.

Gujarat stands out for its robust infrastructure, especially in transportation, with a road network extending over 74,500 kilometers (Egov, 2024), which plays a foundational role in facilitating industrial and trade activities. The state has also laid out an ambitious vision for increasing the share of renewable energy to 40–50% of its total energy portfolio by 2030 (SLBC, n.d.), aligning with the broader goals of sustainable development. The secondary sector contributes maximum to the state's GDP. Furthermore, Gujarat's thriving Micro, Small, and Medium Enterprises (MSME) sector serves as a pillar of regional economic dynamism and employment generation. Initiatives such as the **Gujarat International Finance Tec-City** (GIFT City) position the state as an emerging centre for innovation and global financial integration, attracting business prospects from across the world.

II. LITERATURE REVIEW

India's industrial investment and infrastructure development—particularly in transport, communication, power, and irrigation—have shown uneven patterns, contributing to regional disparities. Despite their smaller size, states like Kerala and Gujarat have drawn global interest for their notable infrastructure progress. The referenced study (Jha & Tandon, 2019) compares their growth models, highlighting the **role of infrastructure** in economic advancement. Gujarat, in particular, has experienced strong growth in manufacturing and services, largely due to its success in attracting both domestic and international investment. Its development strategy emphasizes physical infrastructure as a key driver of sustained economic growth.

Gujarat's industrial sector has played a central role in driving the state's impressive economic growth, with support from the central government and consistent foreign direct investment. While Gujarat is often cited as a development model for other states, there remain notable gaps in comprehensive planning and enforcement mechanisms. Notably, Gujarat is among the few Indian states to adopt the concept of Industrial Ecology, reflecting a proactive approach toward achieving sustainable industrial development. (Kumar & Biswas, 2018)

A study (Akiwatkar & Bhati, 2016) on Gujarat government's role in innovation & entrepreneurship highlights how it plans to strengthen research and development by encouraging R&D institutions to engage in industrial research, disseminate proven technologies, and upgrade laboratories linked with industrial associations. Under the Gujarat **Industrial Policy 2015**, support is extended for the development of core infrastructure—such as electricity, water supply, and road connectivity—in new industrial estates. The policy also promotes private sector participation in establishing small estates and specialized industrial parks.

The Blueprint for Infrastructure in Gujarat (BIG 2020) envisions transforming Gujarat into a globally attractive destination for living and business by promoting rapid, balanced, inclusive, and sustainable growth through strong social, industrial, and physical infrastructure. Within this framework, a paper (Bhanushali, 2019) evaluated Gujarat's infrastructure development, analyzing trends and identifying existing gaps. It primarily focused on core infrastructure components such as roads, railways, power, and ports, while also critically comparing Gujarat's standing within the national infrastructure landscape.

For decades, Gujarat has consistently aimed to enhance quality of life through holistic planning and forward-looking policy interventions. These proactive strategies have significantly improved key social indicators, contributing to better human development outcomes and poverty reduction. According to a study in this context (Parekh, 78-85), paper suggests that in order to sustain and deepen this progress, the state must diversify its approach and explore more innovative strategies to address persistent capability deprivation. It believes that economic growth, particularly through infrastructure development, can have a direct and transformative impact on human well-being and the expansion of individual capabilities.

III. OBJECTIVE

The objective of the study is to analyze the performance of Gujarat in target indicators relevant to **Sustainable Development Goal 9 (SDG-9)**

IV. METHODOLOGY

This study utilizes a qualitative discussion-based methodology and some selectively collected quantitative data to investigate the extent of Gujarat's alignment with the targets of Sustainable Development Goal 9 (SDG-9). The research does not collect any primary data or conduct econometric analyses; rather, it works upon selected secondary data from policy documents, research papers, and governmental publications.

Examples of supporting data used in this paper include the Gross Value Added (GVA) data published by the Ministry of Statistics and Programme Implementation (MoSPI), Annual Survey of Industries, policy briefs, Gujarat State Government portals, and manufacturing-based data from sector-specific reports. When including relevant tables and datasets, we have filtered the tables and datasets selectively as per the relevance of our study. This paper helps in assessing Gujarat's performance on industrialization and infrastructure through SDG-9, and we have organized the discussion basing it upon the following indicators on which we briefly touch upon in this paper:

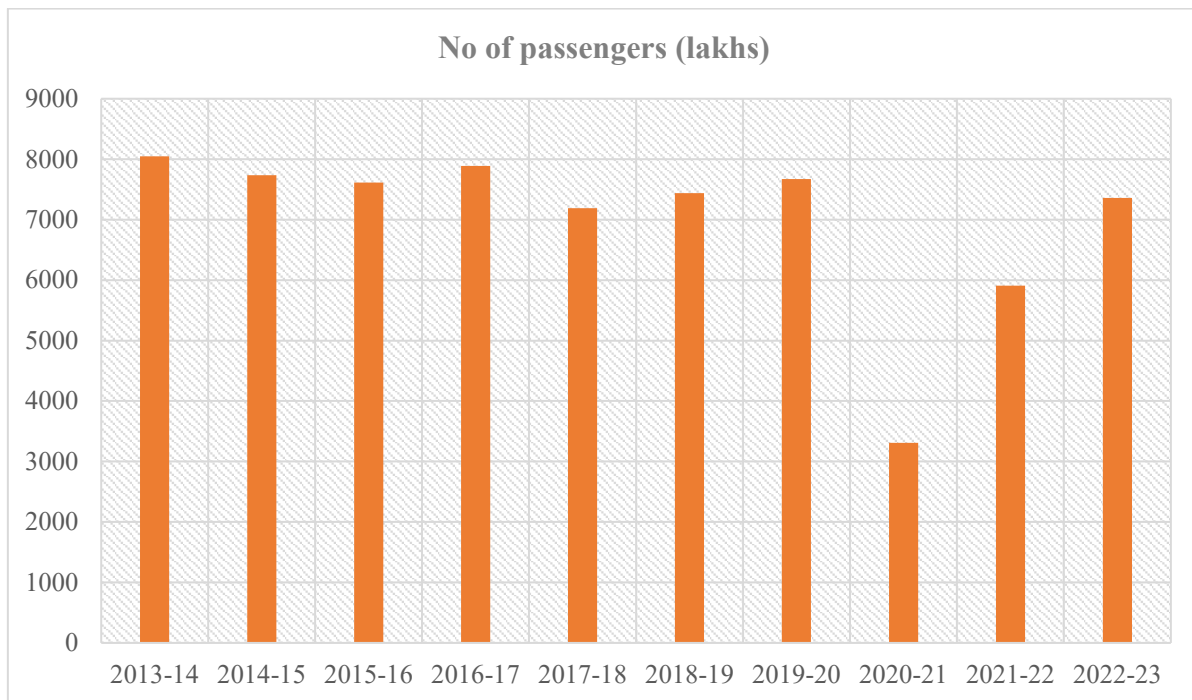
- 9.1.2 Passenger and freight volumes (Transport Infra)
- 9.2 Manufacturing value added as a proportion of GDP
- 9.3.1 Small Scale Industries (We talk about MSME's)
- 9.5.1 Research and development expenditure

V. DISCUSSION

Transport infrastructure, particularly the movement of passengers and freight is an important indicator. It plays a critical role in facilitating economic activity, improving market accessibility by ensuring key materials & people a safe & quick journey. It helps in supporting industrial expansion. This sub-indicator target tries to track trends in passenger and freight volumes. This can help to understand state's connectivity, efficiency, and the transport networks. A higher volume & spread-out network implies better access.

For local & regional commute, GSRTC (Gujarat State Road Transport Corporation) manages most of the travel. In terms of passenger volume and traffic handled at ports the following graphs maps out the trends obtained from past few years:

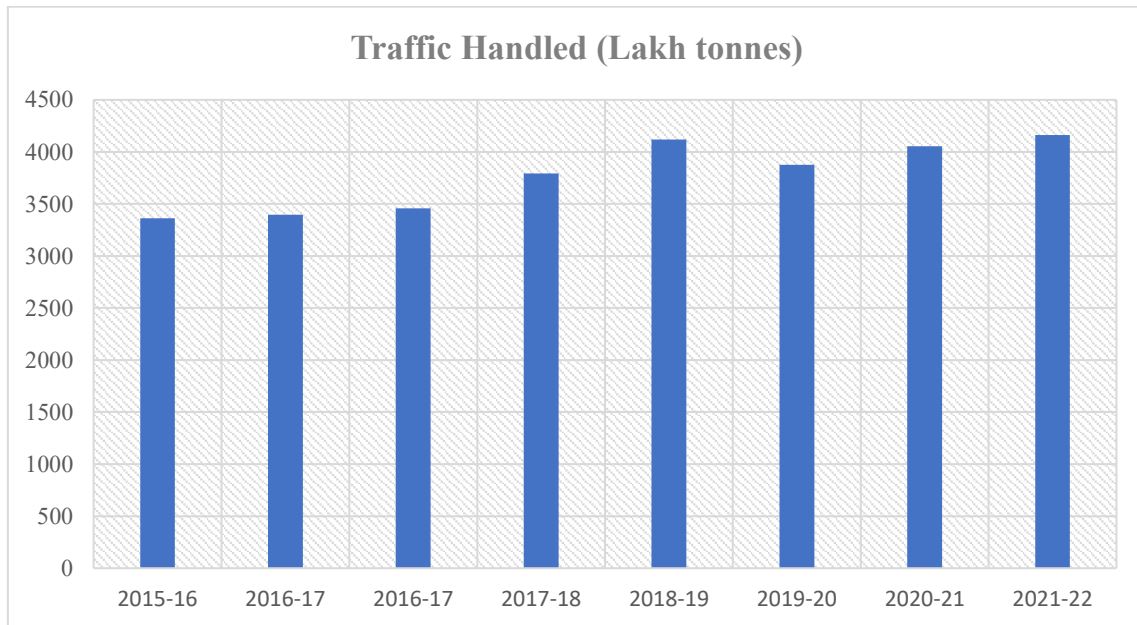
Figure 1: GSRTC Trends on Passengers Carried in Lakhs (Gujarat 2013 – 2022)



Data Table Source: Transport Statistics, Gujarat (2022-23)

Passenger traffic in Gujarat has experienced notable fluctuations. After peaking at over 8,000 lakhs in 2013–14, volumes gradually declined, falling to around 7,188 lakhs by 2017–18. The pandemic caused a steep drop in 2020–21. The last 2 years overall reflects stagnation, which needs to be checked for. If the reason is implied towards quality, capacity or connectivity, it must be then worked upon to meet the demands.

Figure 2: Total Foreign & Coastal Traffic handled at Ports (Intermediate + Minor)



Data Table Source: Transport Statistics, Gujarat (2022-23)

Kandla Port are the largest ports in the state, amongst the top in the country. As per port statistics report, Kandla port generated 314259.28 Lakhs in income over the year 2022-23. It handled 1375 lakh metric tonnes of traffic in the year 2022-23. Other major ports driving the traffic include Mundra, Pipavav, Dahej and Hazira,

Freight traffic through Gujarat's intermediate and minor ports has shown an upward trend, growing from approximately 3,361 lakh tonnes in 2015–16 to over 4,163 lakh tonnes in 2021–22. The volumes dipped slightly in 2019–20. Port operation continue to remain one of the strongest economic activities for the state. The sector's critical role in Gujarat's industrial supply chains appears to get stronger. Improving connectivity and digitising operations will make this journey smoother.

The Annual Survey of Industries provides a blueprint of the state of industrial affairs of the state of Gujarat. Bharuch district ranked first in terms of Gross Value Added (GVA), contributing ₹45,774 crores, which made up around 18.89% of the state's total. Surat had the highest number of industrial workers, with 3,56,716 people employed—about 22.74% of the total workforce. Out of 29 industry categories, five key groups—chemicals, textiles, non-metallic mineral products, machinery, and basic metals—accounted for nearly 48–49% of the total output. Surat also stood out as the top district in terms of providing employment, highlighting its important role in Gujarat's industrial growth. (Govt of Gujarat, 2024)

As per MoSPI data, the secondary sector contributed 44.64% to the Gross Value Added (GVA) in the year 2022-23, of which manufacturing component was 35.2%, followed by Construction at 7% as calculated at Current year prices. Manufacturing occupies the core of Gujarat's growth story, and the industrial growth has been the proof of this story. The growth rate so calculated on GSDP (overall) comes out to be 14.71% over the last year, indicative of a robust economic performance.

Gujarat leads in key industrial sectors like chemicals, petrochemicals, dairy, pharmaceuticals, cement, ceramics, textiles, engineering, and gems & jewellery. The state hosts over 800 large-scale industries and around 4.5 lakh MSMEs. Notably, it has more than 3,300 pharmaceutical manufacturing units, contributing roughly 30–35% to India's total pharmaceutical turnover, which is praiseworthy. (IBEF, 2024)

MSME's or Micro, Small & Medium Enterprises form the backbone of the economic structure. These small businesses, are the very spirit of entrepreneurship. They begin their setup with very limited resources & capital. Not only do they add to the output, but they also provide employment. The time involved in setting up one, if quicker, can boost sectoral performance.

MSMEs in Gujarat provide employment to approximately 8 lakh individuals. The state hosts around 11.26 lakh registered MSMEs, making up 7.5% of the 1.48 crore units registered across India. This highlights Gujarat's strong entrepreneurial culture and its supportive business ecosystem. To further strengthen this sector, the state has been working on several schemes. These schemes offer a variety of incentives, including capital subsidies for micro-industries, interest subsidies, and EPF reimbursement benefits etc. Additional support is also extended to women entrepreneurs, youth-led ventures, startups, and enterprises led by differently-abled individuals. (Kinara Capital, n.d.)

As per the MSME Registration portal, total 436,161 units under manufacturing & 345,754 units under services segment known to be registered cumulatively said to be providing employment to over 45 lakh people. Maximum of such registrations were said to have remain concentrated in the districts of Surat, Ahmedabad and Rajkot. These were UAM registrations to the time frame from Oct 2015 to Feb 2020.

Connectivity is also relied upon heavily on presence of airport infrastructure. Gujarat has 17 airports. Ahmedabad is the state's only international airport. Additionally, there are 3 Indian Air Force airports (2 with civil terminals), 2 private airports under state ownership, commonly used by local residents. This extensive airport network supports regional connectivity as well as allows flow of resources & passengers internationally. (Govt. of Gujarat, n.d.)

Gujarat is home to several institutions that actively promote industrial research and innovation. These institutes supports small and medium enterprises by offering testing, evaluation, and R&D services. Universities across the state are also setting up innovation and incubation centres—often backed by the Student Startup and Innovation Policy (SSIP)—to encourage entrepreneurship and convert research into practical applications. Although no exclusive bifurcation is available for budget allocation on R&D or Innovation in the State Budget, several research-encouraging policies have been outlined.

Gujarat is also focussed on promoting more partnerships between industry and academia. These efforts are designed to produce relevant advancements in technology, efficiencies in processes, and innovative products. Since the state has made rapid growth in its industrial segment, innovation & tech-friendly practices can help it optimise resources suitable to its needs.

There are also strategic efforts around emerging technologies, particularly Artificial Intelligence (AI). The establishment of the **Gujarat AI School & an AI Centre of Excellence** are some steps in the right direction to build capability and foster innovation in this emerging area such as industrial products.

VI. CONCLUSION

To keep up its economic momentum and realize its long-term development prospects, Gujarat needs to align more effectively with the goals of SDG 9. This means there has to be an intentional push toward sustainable infrastructure development, inclusive and environmentally responsible industrial practices, and innovation-promoting policy frameworks. Despite achievements on this path, the still has to deal with certain challenges and be prepared for any external shocks. The industrial base of Gujarat's economy is excellent. As it moves ahead, better data collection regarding innovative practice outcomes & addressing these issues is crucial for shaping the Gujarat model that is not only healthy & forward-looking but also inclusive and equitable.

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