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## Evaluating sustainable industrial policy in Punjab: A regional development perspective

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### Abstract

This paper examines the intersection of industrial policy, economic growth, and sustainable development through a case study of Punjab, India. It critiques GDP-centric industrialization for neglecting environmental and social concerns and calls for a sustainability-oriented shift. Using a mixed-methods approach, it combines policy analysis with quantitative assessment of industrial and sustainability indicators. The study advocates a meso-level policy lens to address regional disparities and institutional capacities. It proposes a multi-scalar strategy-linking national incentives, regional ecosystem building, and firm-level innovation-to drive sustainable industrial transformation. By integrating economic, environmental, and social dimensions, the paper offers a framework for rethinking industrial policy to foster long-term resilience, equity, and sustainable development.

**Keywords:** Sustainable industrial policy, punjab, meso-level governance, green growth, industrial development

### Introduction

Industrial development has historically been framed within narrow economic terms-centered on GDP growth, industrial output, and capital accumulation-often to the exclusion of its environmental and social ramifications. This linear thinking has perpetuated a model of development that assumes sustainability to be a constraint rather than a prerequisite for long-term prosperity. As global economies confront the mounting costs of environmental degradation, resource depletion, and social inequality, the need for a more holistic and integrated framework for industrial policy becomes urgent. At the heart of such a framework is the principle of intergenerational equity-the idea that current economic decisions must not compromise the ability of future generations to meet their own needs. This ethic forms the core of sustainable thinking and demands a paradigm shift from growth-at-all-costs toward growth-within-boundaries. It calls for balancing economic competitiveness with ecological stewardship and social inclusion.

Sustainable industrial policy, therefore, requires a shift in both thinking and doing-from isolated sectoral strategies to systems thinking that acknowledges feedback loops, cross-sectoral interdependence, and trade-offs. Policy formulation must go beyond economic efficiency and engage with metrics such as environmental impact, social well-being, and long-term resilience. Tools such as life cycle assessment, environmental impact analysis, and stakeholder consultations are critical in shaping adaptive and context-sensitive interventions. While much of the policy discourse and empirical analysis has focused on national-level strategies-understandable given the centralized nature of industrial policy making-this top-down view often fails to account for regional asymmetries in infrastructure, institutional capacity, and socio-economic dynamics. In countries like India, where economic geography is deeply heterogeneous, the need for a meso-level approach to policy becomes apparent.

A meso-level lens offers the flexibility to design industrial strategies that are tailored to the specificities of sub-national regions. It enables governments to respond to local institutional quality, resource availability, workforce characteristics, and environmental constraints. In this context, Punjab emerges as a particularly relevant case. Once a frontrunner in India's agricultural and early industrial development, the state has experienced a relative decline in economic dynamism. Its industrial sector has stagnated, and concerns around ecological degradation and labor informality are growing.

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This study investigates the intersection of industrial policy, economic growth, and sustainable development in Punjab, using it as a case study to explore how sub-national industrial strategies can be reoriented towards sustainability. It analyzes whether existing policy frameworks in the state reflect an integrated understanding of environmental limits, social inclusion, and economic viability.

To do this, the study draws on sustainable development paradigms, systems-based approaches, and multi-level governance theory, highlighting the need for alignment across macro (national), meso (regional/sectoral), and micro (firm-level) dimensions.

- At the macro level, the state must ensure regulatory and fiscal incentives support a green transition.
- At the meso level, policies must build industrial ecosystems that are both competitive and resource-efficient.
- At the micro level, firms-especially small and medium enterprises-must be empowered to adopt sustainable technologies and inclusive business practices.

Sustainable industrialization is not only about cleaner technologies or greener factories; it is also about reforming institutions, rethinking incentives, and redesigning how we measure economic success. By positioning Punjab within this broader theoretical and policy discourse, this research aims to contribute to the growing body of literature that calls for a reconceptualization of industrial policy—one that aligns economic objectives with the ethical, social, and ecological imperatives of the 21st century.

## Literature Review

Industrial policy refers to a set of government instruments aimed at directing structural transformation, with implications that extend beyond economic growth to encompass social progress and political equilibrium both within and between nations. It is not merely about boosting productivity or competitiveness but also about shaping broader development trajectories. Industrial policy is generally grounded in four principles: intervention is justified by market failures; actions must enhance national competitiveness; policies should reshape sectoral behavior and structure; and they must enable structural transformation through resource reallocation.

Cohen (2006) <sup>[9]</sup> outlines three main approaches to industrial policy: the neoclassical approach, which focuses on correcting market failures; the structuralist approach, aimed at fostering global competitiveness; and the pragmatic approach, which enhances the capabilities of public and private actors to adapt to economic change. Va Lila (2006) <sup>[39]</sup> expands this framework by emphasizing equity, suggesting that support should also consider social and regional distributional concerns alongside efficiency.

Glykou and Pites (2011) <sup>[16]</sup> contrast the neoclassical model, which targets inefficiencies, with the systems approach, which emphasizes innovation and resource creation. Harr (2014) <sup>[19]</sup> integrates these views, advocating structural transformation for long-term growth. Similarly, Crafts (2010) <sup>[10]</sup> and El-Agraa (1997) <sup>[12]</sup> define industrial policy as strategic state-led resource reallocation to boost sectoral performance. Bianchi and Labory (2006) <sup>[6]</sup> describe industrial policy as a dynamic, coordinated effort that ranges from revitalizing declining industries to fostering new sectors. Geroski (1989) <sup>[15]</sup> adds an institutional lens,

highlighting the role of industrial policy in shaping market-state boundaries and governing frameworks. Gual (1995) <sup>[18]</sup> classifies industrial policy into horizontal (broad-based), vertical (sector-specific), and structural change interventions (Figure 1). Pack (2006) <sup>[28]</sup> broadens horizontal policy to include institution-building and technology promotion, stressing the need for stable property rights and capacity development.

In the knowledge economy, Bianchi and Labory (2006) <sup>[6]</sup> stress “technological activism” through a framework based on entitlements, provisions, innovation, and territory, underscoring regional responsiveness and national alignment.

There is a growing emphasis on meso-level or regional industrial policies, which focus on local development by addressing the specific economic conditions and needs of a region. As implementation challenges become more apparent in academic and policy circles, greater attention is being given to strategies that foster regional competitiveness and innovation. These policies typically blend national and local interventions and often centre around the development of industrial clusters-geographically concentrated networks of interconnected firms and institutions. Clusters enhance innovation, knowledge sharing, and productivity by providing firms with access to specialised labour, capital, and infrastructure.

The core idea behind regional strategies is to generate and retain value locally. This includes identifying competitive strengths, leveraging the role of multinationals, building regional branding, embedding into global production networks, and supporting SMEs to ensure inclusive growth. Such policies can correct regional imbalances by promoting job creation and investment in lagging areas, while also strengthening networks among local businesses, universities, and other actors to stimulate innovation and entrepreneurship.

However, there are potential downsides. Regional competition for investment can sometimes devolve into a ‘race to the bottom’, with excessive subsidies and incentives that undermine long-term strategic planning. Fragmentation of national markets is another concern, particularly in countries with smaller domestic bases where firms rely on national scale for efficiency. Despite these risks, regional industrial policy is increasingly seen as a vital tool for balanced development. Two theoretical approaches support this view: Evolutionary Economic Geography (EEG) and Institutional Theory. EEG focuses on the historical and adaptive nature of regional industrial development, stressing innovation and path-dependence. Institutional Theory highlights the role of appropriate governance structures and the capacity for institutional transformation in shaping regional growth trajectories.

Innovation economics also contributes significantly to this field. It highlights how proximity among firms promotes knowledge spillovers, faster learning, and collective efficiency through formal and informal cooperation. These advantages, however, emerge over time and require supportive institutions in technology, education, and information. A more recent framework, ASID-Agency, Structure, Institutions, Discourse-integrates various theoretical strands to better understand local industrial dynamics. It examines how local actors shape development, how structural conditions constrain or enable action, the role of institutions in guiding outcomes, and how discourses

influence decision-making. The ASID framework is particularly useful for capturing the complex, multi-scalar nature of industrial policy, allowing for a nuanced understanding of how local and regional economies evolve and compete in a globalised world.

Scholars have argued that meso-provincial industrial policy is crucial for promoting industrial development. Meso-provincial industrial policy takes into account the location-specific advantages and disadvantages of a region and tailors policies accordingly. This approach recognises that different regions have different industrial structures and require different policy interventions. Meso-provincial industrial policies can also provide a more targeted approach to industrial development than national-level policies, which may be too broad to be effective. Moreover, scholars have noted that meso-provincial industrial policy can promote regional development and reduce regional disparities. By promoting industrial development in less-developed regions, meso-provincial industrial policy can generate employment and income, improve infrastructure, and reduce poverty. This can help reduce regional disparities and promote more balanced regional development.

### **Sustainability Dimensions of Industrial Policy**

Sustainable industrial policy is a framework that fosters economic growth while safeguarding the environment, promoting social equity, and encouraging innovation. Its roots lie in the environmental movements of the 20th century, which exposed the costs of unchecked industrialization. Thinkers like Friedrich Schmidt-Bleek advanced this discourse by proposing models such as 'Factor 10', advocating for resource-efficient production through innovation and behavioral change.

Modern sustainable industrial policy integrates goals like resource efficiency, renewable energy use, circular economy practices, stakeholder participation, and global cooperation. Life Cycle Assessments, Circular Economy models, Eco-Industrial Parks, and Integrated Assessment Models are key tools that help assess impact and guide sustainable practices across sectors.

This policy framework aligns closely with several Sustainable Development Goals (SDGs), particularly SDGs 3, 8, 9, and 12. Clean technologies improve health, circular practices reduce waste, and inclusive policies generate decent work and resilient infrastructure. Measurable targets in emissions, energy use, job creation, and R&D investment are essential to track progress, while the inclusion of businesses and labor unions ensures accountability and equity.

Manufacturing, a core economic driver, must evolve to reduce environmental harm. Sustainable industrial development (SID) emphasizes cleaner production, efficiency, and reduced waste-enhancing both competitiveness and environmental outcomes. However, high transition costs, regulatory gaps, and limited awareness remain key challenges.

To overcome these, policy must support innovation, incentivize green technologies, and integrate circularity at the system level. Aligning industrial strategies with broader development agendas, building workforce capacity, and fostering stakeholder trust are crucial for a resilient, inclusive, and sustainable industrial future.

### **Methodology**

The methodology adopted for this research study involves an interdisciplinary mixed-methods approach that combines both quantitative and qualitative assessment methods. This approach is best suited for investigating the complex contextual phenomena of the relationship between industrialization, economic growth, and sustainable development, and allows for a more comprehensive understanding of the research questions.

The first component of the methodology involves the use of qualitative methods to collect and analyse secondary data through case studies, reports, administrative data, and analytical pieces. This would allow for an in-depth exploration of the policy landscape for industrial development in the state, the effectiveness of these policies in promoting sustainable growth, and the potential for sustainable industrial development in Punjab. The second component of the methodology involves the use of quantitative methods to collect and analyse statistical data on economic growth, industrial development, and sustainable development indicators in Punjab. The study will use secondary data sources, such as government reports and databases, to provide a descriptive analysis of the nature of economic growth and industrial development in Punjab and the extent to which these are linked to sustainable development. The study will employ meso level manufacturing indices for statistical analysis to examine industrial competitiveness, performance and output.

### **The study aims to address the following research questions**

1. What is the nature of economic growth in Punjab and how much of it is attributed to industrial development?
2. Does the policy landscape of Industrial development in the state incorporate sustainable growth propositions?

These research questions will guide and help to provide a comprehensive understanding of the interlinkages between industrial development, economic growth, and sustainable development from a public policy perspective, with a specific focus on Punjab's industrial policy.

### **Situating Sustainability in India's Industrial Policy**

In India, industrial development is constitutionally mandated as a means to achieve socio-economic growth. Falling under the Concurrent List, both central and state governments can legislate on this matter. Article 38 directs the State to promote a just social order, which includes industrial development. At the central level, the Ministry of Commerce and Industry frames industrial policies, promotes manufacturing, attracts FDI, and facilitates technology transfer. States, in turn, provide infrastructure, clearances, incentives, and regulate aspects like labour laws and environmental standards, tailoring industrial policies to local contexts.

Post-independence industrial policy featured planning via Five-Year Plans, starting in 1951. The Second Plan (1956-61), based on the Mahalanobis model, prioritized capital goods, leading to a heavy industry bias. The Third Plan continued this trajectory. The Industrial Policy Resolution of 1948 reserved strategic industries for government control. Public sector expansion intensified after the 1969 nationalization of private firms. The MRTP Act (1969) restricted large firms' growth, while FERA (1973) capped



foreign equity at 40 percent except in select sectors (Bhattacharjea 2022) <sup>[5]</sup>. Industrial licensing under the Industries (Development and Regulation) Act (1951) mandated approvals for capacity changes, technology imports, and new products. Price and distribution controls further tightened state regulation. Though these policies diversified Indian manufacturing, arbitrary controls created inefficiencies. Private sector incentives clashed with socialist planning. Oligopolies entrenched market power, and public sector lending at subsidized rates created losses (Bhattacharjea 2022) <sup>[5]</sup>.

Reforms in the 1980s included amendments to the Industrial Disputes Act (1982) and MRTP Act (1984), lowering regulatory thresholds (Kapparashetty 2018) <sup>[42]</sup>. The New Textile Policy liberalized operations. Rajiv Gandhi's modernization drive spurred the IT sector. Trade and investment liberalization picked up pace, with faster clearances and easier tech collaboration (Bhattacharjea 2022) <sup>[5]</sup>.

The Insolvency and Bankruptcy Code (2016) streamlined the resolution of distressed firms, enhancing business confidence. Labour law thresholds and compliance processes were liberalized under the NDA government, along with support for MSMEs and PLI schemes for large firms. However, industrial growth has raised environmental concerns. Industry emits a quarter of India's GHGs-twice the world average per GDP unit. Stronger reforms in energy use, waste disposal, and greener production are crucial. Centre and states must collaborate on non-conventional energy and sustainable growth. Though green regulations exist, their evaluation remains weak. The NGT has enforced environmental accountability.

India pledged to cut emissions intensity by 20-25 percent by 2020 (achieved 21 percent by 2020) and 33-35 percent by 2030. Measures like Jal Shakti Abhiyan, electric mobility, and metro transport aim to support these goals. States can improve incentives for green industry via five policy levers: supporting wastewater treatment, energy/water conservation, renewables, pollution control, and cluster-level facilities. Yet fiscal incentives alone haven't ensured long-term compliance (Rana and Thakkar 2021) <sup>[43]</sup>.

Some states have made progress through solid waste management systems. The 2012 National Water Policy and proposed water-use efficiency bureau underscore water conservation. Since 2000, energy efficiency gains offset 6 percent of projected energy use, though rising transport and construction demands have neutralized benefits. The Perform, Achieve, and Trade (PAT) scheme mandates energy reductions from intensive industries, cutting energy use by 4-5 percent between 2012-2015. The Energy Conservation Act (2001) ensures energy audits. The ZED (Zero Effect Zero Defect) model evaluates MSMEs' quality and energy practices, encouraging sustainable methods.

These initiatives cover about 23 percent of India's energy use (Rana and Thakkar 2021) <sup>[43]</sup>, reflecting a shift toward sustainable industrialization. Under the Water Act (1974) and Air Act (1981), industries must obtain consent to operate from pollution control boards. High-emission units must install real-time emission monitors (CEMS). Eco-industrial parks, such as those in Gujarat's Naroda, Sachin, and Vapi clusters, exemplify waste reduction and resource-sharing benefits. State governments also offer financial support for water and energy conservation initiatives.

### **Analysing Punjab's Structural Transformation**

Economic growth in Punjab has moderated in recent years, mirroring national trends. The state's GSDP grew by 6.3 percent in 2021-22(Q) and 6.1 percent in 2022-23(A). Per capita GSDP for 2022-23(A) was Rs 1,97,802, showing 7.9 percent growth over the previous year. Per capita income stood at Rs 1,73,873, 1.02 times the national average. Since 2013-14, Punjab's growth has generally lagged behind India's, though 2020-21 saw a brief reversal. In 2022-23(A), Punjab's real GSVA growth was 5.4 percent compared to 6.7 percent nationally. Agriculture remains the cornerstone of Punjab's economy, with strong multiplier effects-each unit increase in agricultural output spurs a 1.4 unit increase in services and 1.8 in industry (Economic Survey of Punjab 2022-23). Agro-based industries benefit directly, and cereals transport boosts services. Higher farm incomes stimulate overall demand. Punjab is progressing toward balanced growth, with the industrial sector comprising nearly 25 percent of GSVA in 2022-23(A). Manufacturing, at 15 percent, grew at 4.9 percent from 2012-13 to 2019-20 and remains the largest industrial contributor after cropping. Agro-led industries like food processing and textiles are prominent, with Ludhiana emerging as a major North Indian manufacturing hub. Light engineering, notably bicycles and auto parts, is significant (Singh 2020). Textile and engineering parks are expected to further spur industrial growth.

The services sector is estimated to grow at 6.8 percent in 2022-23(A), reflecting Punjab's gradual shift toward a service-based economy (ibid.). However, industry remains a core focus, with targeted policy support.

Unemployment has declined from 7.3 percent to 6.2 percent in Punjab and from 4.8 percent to 4.2 percent nationally (ibid.), largely due to increased opportunities in industry and services. Industry accounts for a quarter of Punjab's GSVA and a third of its employment. Manufacturing comprises over half the industrial GSVA, with construction contributing over a quarter (IDCa 2018) <sup>[21]</sup>. Between 2013-14 and 2022-23, Punjab's industrial sector grew at 4.7 percent, just below the national average of 4.9 percent. In 2022-23(A), industrial GSVA grew by 4.3 percent in Punjab vs. 4.1 percent nationally (ibid.). Manufacturing grew by 2.05 percent in 2022-23(A), closely tracking overall industrial growth of 4.33 percent. Despite modest GSVA growth, the Index of Industrial Production (IIP) surged 9.05 percent in 2021-22, led by manufacturing at 12.05 percent (ibid.), suggesting robust physical output but potential stagnation in value addition.

Top-performing IIP categories over recent years include Chemicals, Motor Vehicles, Beverages, Wearing Apparels, and Textiles. Underperformers include Coke & Petroleum, Printing Media, and Paper Products. Manufacturing leads in industrial employment, followed by construction and utilities. Though manufacturing employment declined between 2011-12 and 2017-18, it rebounded by 2020-21 (ibid.). The sector's labour-intensity is high, with employment elasticity twice the national average. This is driven by small-sized firms, a structure largely unchanged since 2011-12 (NSSO Unorganised Manufacturing Data). In 2011-12, 82 percent of factories employed just 16 percent of workers in units with 500+ employees. About 90 percent of Punjab's factories are MSMEs, accounting for 75 percent of employment, 40 percent of GVA, and 18 percent of fixed capital-higher than the national average (IDCb 2018) <sup>[22]</sup>.

The industrial sector contributes around half of total investment in Punjab, with gross capital formation forming 33 percent of GSVA in 2020-21. Although capital intensity is low, job creation remains strong.

Manufacturing's share in industrial capital formation declined from 87 percent in 2011-12 to 66 percent in 2020-21 (ibid.), while construction rose to 26 percent. Agro-industries like food products, textiles, and apparel contribute around 33 percent to GVA. Sectors like machinery and motor vehicles lead in capital intensity and profitability. MSMEs are central to Punjab's industrialization, especially in rural areas, with over 4 lakh units across auto components, bicycles, hosiery, sports goods, and agricultural tools. Over 99 percent of units are SSIs, with less than 1 percent in the Medium & Large (M&L) category (IDCa 2018) <sup>[21]</sup>. Despite their small number, M&L units contribute over 50 percent of production, 65 percent of fixed investment, and employ 20 percent of the workforce (Director of Industries, Punjab). SSIs, employing 80 percent of labour, produce 40 percent of output and account for 20 percent of fixed investment. Their labour-absorption capacity has risen by 10 percentage points over the past three decades (IDCb 2018) <sup>[22]</sup>.

### Punjab's Sustainability Assessment

Undoubtedly, to achieve growth and development in any sector, development policies and planning contribute a transforming role. Similarly, industrial policy plays a crucial role in the industrial development of an economy. It focuses on framing rules, regulations and principles by the government that supported the process of industrialization in the state or country. It includes setting up objectives and targets, and then explaining the measures to be undertaken for achieving the same. Industrial policies are announced both at the state as well as at the central level. In Punjab, industrial policy is announced by the Directorate of Industries, Chandigarh. The industrial policy at central level, on the other hand, is announced by the Department of Industrial Policy and Promotion which is under the Ministry of Commerce and Industry, Government of India. Till now, ten industrial policies have been framed and announced in

Punjab - i. Industrial Policy of 1978; ii. Industrial Policy of 1987; iii. Industrial Policy of 1989; iv. Industrial Policy of 1992; v. Industrial Policy of 1996; vi. Industrial Policy of 2003; vii. Industrial Policy of 2009; viii. Industrial Policy of 2013; ix. Industrial Policy of 2017; x. Industrial Policy of 2022.

In this research study, a comparative analysis of the two most recent Industrial Policies, that is, Industrial and Business Development Policy 2017 and Punjab Industrial and Business Development Policy 2022, will be conducted. The assessment will be done in a tabular format with a focus on policy measures derived from SDG 3 (Good Health and Well-being), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production). The objective of this analysis is to provide an analytical understanding of the industrial policies and their alignment with comprehensive sustainability.

### Qualitative and Quantitative Assessment

This study evaluates whether Punjab's two Industrial Policies adequately address environmental and social sustainability concerns. Recognizing the role of industrial policy in promoting economic growth, the research underscores the need to integrate sustainability into policy design and implementation.

A qualitative assessment is conducted using eight specific sustainability measures derived from Sustainable Development Goals (SDGs) 3, 8, 9, and 12, which are directly relevant to the core sectors targeted by the policies. These SDGs provide a holistic framework for evaluating sustainable development and guide the analytical framework of the study. The analysis focuses on how comprehensively the policies incorporate these measures and the nature of corresponding policy interventions. It also considers the broader context, including policy objectives, scope, and implementation mechanisms. To operationalize this, a set of evaluation criteria-based on the identified sustainability indicators-is applied to assess each policy's alignment with comprehensive sustainability goals.

Elements of sustainable policy measures	Policy interventions	
	Industrial Policy 2017	Industrial Policy 2022
Ensuring strict regulations for workplace safety (SDG 3)	The State would allow permission to the companies to have 24*7 operations to run in three shifts, subject to approved precautionary measures taken to ensure the safety of employees, particularly women.	The State would allow permission to the companies to have 24*7 operations to run in three shifts, subject to approved precautionary measures taken to ensure the safety of employees, particularly women. Women employees shall be allowed to work in night shifts till 11 pm provided the employer provides necessary security and arranges to ensure women employees reach home safely.
Skill development (for mainstream and green jobs) (SDG 8)	Setting up of a state skill development mission and the University of Skills and Vocational Education.	Setting up of cluster-specific skill centres and sector-specific skill centres for various manufacturing processes.
Promotion of local products to reduce carbon footprint of transportation and support the local economy (SDG 8)	N/A	N/A
Facilitating the provision of shared facilities in industrial clusters (SDG 9)	The policy outlined the aim to: i) To carryout in depth study of 10 clusters every year for specific interventions to increase their competitiveness ii) To upgrade and set up common facility centres in 10 clusters every	The state will facilitate the development of at least 20 Rural Industrial Clusters and, 15 Industrial Parks in the State. In addition: i) To carryout in depth study of 10 clusters every year for specific interventions to increase their competitiveness ii) To upgrade and set up common facility

	year iii) To set up one Skill centre for each identified industrial cluster iv) Strengthening of the existing industrial cluster on the Chandigarh-Amritsar corridor.	centres in 10 clusters every year iii) Develop/promote Warehousing facilities near existing clusters, in case such demand exists. iv) The State will follow a cluster approach for development of the MSME Sector. v) The State will set up one Technology Centre and a Common Facility Centre for each major industrial cluster
Enhancing the growth of the renewable energy sector (SDG 9)	State will build a competitive NRSE manufacturing facility that can help develop the solar/ biomass/ small hydro etc. energy ecosystem, to facilitate the growth of renewable energy in the state.	The state shall provide for facilitation for setting up of Green Hydrogen Projects under the National Green Hydrogen Policy.
Investing in Research and Development (SDG 9)	Setting up of industrial R&D labs for MSMEs and large industries to facilitate investment in the state	Capital subsidy to MSMEs for engaging in research and development activities.
Ensuring effective measures for pollution control (SDG 12)	50 percent financial support subject to max of Rs. 25 lakh on capital cost for setting up of effluent treatment plant and for installation of Air Pollution Control Devices	Installing of pollution control devices and equipments, and requiring different industries to ensure pollution control measures
Encouraging water and energy conservation through incentives (SDG 12)	N/A	50 percent financial support subject to max of Rs. 25 lakh on capital cost for setting up of Water Pollution Control Devices
Offering support for establishing a wastewater treatment facility (SDG 12)	N/A	N/A
Instituting circular production process (SDG 12)	N/A	In a measure to promote circular economy, adoption of the following measures: i) Shredding units engaged in the shredding of auto vehicles & auto parts and providing its finished products in the steel making units ii) Manufacturing of Biodiesel iii) Processing of Plastic waste into any usable Products iv) Waste management units leading to some usable product

**Source:** Author' analysis; Industrial Policy, Government of Punjab (2017 & 2022)

Quantitative analysis of industrial capacity is one approach to assess the sustainability of industrialization. This involves measuring the amount of production and resource efficiency in the industrial sector and analysing its impact on the environment, such as greenhouse gas emissions and water pollution. Quantitative assessment of industrial capacity has several benefits, such as tracking progress towards sustainable development goals, providing a basis for benchmarking and comparisons, and informing investment decisions.

This study uses a manufacturing-specific approach to expand the Competitiveness and Industrial Performance framework to include social and environmental indicators (*Inclusive and Sustainable Competitive Industrial Performance Index*) (CIP) to assess the level of countries' industrial competitiveness. The approach includes a social and an environmental manufacturing-related indicator, such as the SDG 9 related carbon emissions productivity and employment intensity indicators. By creating synergies with manufacturing-specific environmental and social impacts,

such as the capacity to produce manufacturing value-added from each single tonne of manufacturing CO<sub>2</sub> emissions and the capacity to generate manufacturing employment, this approach develops an index that represents the level of countries' industrial competitiveness (UNIDO 2021) <sup>[38]</sup>.

The synthetic index aims to detect the level of countries' industrial competitiveness, generating positive spillovers in terms of poverty eradication and efficiency in reducing CO<sub>2</sub> negative externalities. This approach aligns with the SDGs' 2030 agenda, which emphasises addressing social, economic, and environmental challenges simultaneously. By expanding the CIP framework to include social and environmental indicators, this study aims to provide a comprehensive and nuanced understanding of countries' industrial competitiveness in the context of sustainable development. Additionally, the study adjusts the index for meso-level state-specific analysis and compares the indices for Punjab to national level averages to assist in the assessment.

Punjab Manufacturing Specific Inclusive and Sustainable Competitive Industrial Performance Index	
Economic	
State's manufacturing value added per capita (2021-22)	Rs 49,884 (\$ 607.38) (India's per capita manufacturing GDP is Rs 37,152)
State's export per capita (2021-22)	Rs 18,906 (\$ 230.15) (India's manufacturing export per capita is Rs 27,008 (\$337.6))
Share of state's manufacturing value added in country's manufacturing value added (2021-22)	3.09 percent (For a comparative view, Maharashtra contributes 20 percent to the country's industrial output)

Share of state's exports in country's exports (2021-2022)	2 percent (States like Maharashtra and Gujarat contribute 24 percent and 20 percent respectively to the country's manufacturing exports)
Share of state's value added in country's GDP (2021-22)	2.35 percent (States like Maharashtra, Tamil Nadu and Gujarat contribute 14.6percent, 8.8percent and 7.8percent to India's GDP)
<b>Environmental</b>	
Manufacturing carbon productivity (manufacturing value added/manufacturing carbon emissions ratio)	Punjab: 20,398 per tonne of carbon dioxide India: 17,136 per tonne of carbon dioxide
<b>Social</b>	
Manufacturing employment intensity (manufacturing employment/population ratio)	Punjab: 0.0188 India: 0.04

**Source:** Author's calculations

## Discussion

Industrial policy is a multifaceted instrument that influences economic structures by supporting industries, shaping trade, and creating enabling legal and institutional environments. It is central to modern economic development, contributing to GDP growth, employment, and poverty alleviation. Industrialization also drives complementary investments in infrastructure, education, and health, enhancing welfare and economic opportunity across income groups.

In Punjab, industrialization has contributed significantly to Gross State Value Added (GSVA), yet current practices are not environmentally or socially sustainable. This study, through three core hypotheses and research questions, underscores that industrial growth alone does not ensure long-term development. Sustainable industrial policy is necessary to align economic goals with environmental and social imperatives.

The qualitative analysis of Punjab's Industrial Policies (2017 and 2022) assessed their alignment with select Sustainable Development Goals (SDGs):

- **SDG 3 (Workplace Safety):** Addressed in both policies.
- **SDG 8 (Local Economy & Skill Development):** Only the 2022 policy promotes local sourcing.
- **SDG 9 (Innovation & Renewable Energy):** Both encourage R&D and clean energy.
- **SDG 12 (Sustainable Consumption & Production):** The 2022 policy supports water and energy conservation, and circular production, but both policies lack provisions for wastewater treatment.

These gaps highlight the need for continuous policy evolution to ensure relevance and responsiveness to emerging sustainability challenges. Quantitative findings further reinforce Punjab's mixed performance. While the state's per capita manufacturing value added (Rs 49,884) exceeds the national average, its export per capita (Rs 18,906) remains below India's average, suggesting untapped potential in export-led industrialization. Punjab contributes 3.09 percent to national manufacturing value added, significantly trailing industrial heavyweights like Maharashtra and Gujarat. Its share in national exports (2 percent) and GDP (2.35 percent) also indicate a relatively subdued national footprint.

Notably, Punjab's carbon productivity (20,398) outperforms the national average (17,136), reflecting greater emission efficiency. However, employment intensity (0.0188) is less than half the national average (0.04), revealing significant underemployment within the sector. With 95 percent of industrial activity concentrated in micro-enterprises, Punjab's manufacturing base remains highly labour-intensive yet under-leveraged for inclusive growth. Looking

ahead, the industrial sector is projected to grow at 9.0-9.5 percent annually by 2030, with a targeted increase in economic contribution from 25 percent to 40 percent. The state's employment rate (6.2 percent), already higher than the national average, underscores the potential of industry-led job creation. However, challenges persist in export competitiveness, green innovation, and employment absorption. Punjab now stands at a pivotal juncture. Its relatively efficient carbon performance, combined with strong labour availability, offers a unique opportunity to anchor growth in sustainability. By addressing policy gaps—particularly in wastewater management and local product promotion—and promoting skill development, clean technology, and circular economy principles, Punjab can chart a path toward resilient, inclusive, and sustainable industrial development.

## References

1. Andreoni A, Chang HJ. The political economy of industrial policy: Structural interdependencies, policy alignment and conflict management. *Structural Change and Economic Dynamics*. 2019;48:136-150.
2. Ashmarina S, Vochozka M, editors. *Sustainable Growth and Development of Economic Systems: Contradictions in the Era of Digitalization and Globalization*. Cham: Springer; 2019.
3. Barro RJ, Sala-i-Martin X. *Economic Growth*. 2nd ed. Cambridge: MIT Press; 2014.
4. Belussi F. Policies for the development of knowledge-intensive local production systems. *Cambridge Journal of Economics*. 1999;23(6):729-747.
5. Bhattacharjea A. Industrial policy in India since independence. *Indian Economic Review*. 2022;57(2):565-598.
6. Bianchi P, Labory S. *International Handbook on Industrial Policy*. Cheltenham: Edward Elgar; 2006.
7. Bianchi P, Labory S, Tomlinson P, editors. *Handbook of Industrial Development*. Cheltenham: Edward Elgar; 2023.
8. Clydesdale G. *Industrial Development: How States Build Capabilities and Deliver Economic Prosperity*. Abingdon: Routledge; 2022.
9. Cohen E. Theoretical foundations of industrial policy. *EIB Papers*. 2006;11(1):84-106.
10. Crafts N. Overview and policy implications: Learning from some of Britain's successful sectors. *Department for Business, Innovation and Skills Economic Paper*. 2010;6:1-17.
11. Dufrénot G. *New Challenges for Macroeconomic Policies: Economic Growth, Sustainable Development, Fiscal and Monetary Policies*. Cham: Palgrave Macmillan; 2023.
12. El-Agraa AM. UK competitiveness policy vs Japanese



- industrial policy. *The Economic Journal*. 1997;107(444):1504-1517.
13. Enders JC, Remig M, editors. *Theories of Sustainable Development*. London: Routledge; 2015.
  14. Gallopín GC. *A Systems Approach to Sustainability and Sustainable Development*. New York: United Nations; 2003.
  15. Geroski PA. European industrial policy and industrial policy in Europe. *Oxford Review of Economic Policy*. 1989;5(2):20-36.
  16. Glykou I, Pitelis CN. On the political economy of the state, the public-private nexus and industrial policy. *Policy Studies*. 2011;32(4):461-478.
  17. Gollin D. The Lewis model: A 60-year retrospective. *Journal of Economic Perspectives*. 2014;28(3):71-88.
  18. Gual J. The coherence of EU policies on trade, competition and industry. *Centre for Economic Policy Research Discussion Paper*. 1995;1105.
  19. Harr LN. Do patterns of trade and international competitiveness support the case for industrial policy? *Policy Studies*. 2014;35(3):221-245.
  20. Hess PN. *Economic Growth and Sustainable Development*. 2nd ed. London: Routledge; 2016.
  21. Institute for Development and Communication (IDCa). *Industrial Development and Employment in Punjab*. Chandigarh: IDC; 2018.
  22. Institute for Development and Communication (IDCb). *Punjab Industrial Sector Scenario*. Chandigarh: IDC; 2018.
  23. Leal Filho W, Azul AM, Brandli L, Özuyar PG, Wall T. *Industry, Innovation and Infrastructure*. Cham: Springer; 2020.
  24. Nagaraj R, editor. *Industrialisation for Employment and Growth in India*. Cambridge: Cambridge University Press; 2021.
  25. Noman A, Stiglitz JE, editors. *Efficiency, Finance, and Varieties of Industrial Policy: Guiding Resources, Learning and Technology for Sustained Growth*. New York: Columbia University Press; 2017.
  26. Organisation for Economic Co-operation and Development (OECD). *Industrial Policy for the Sustainable Development Goals: Increasing the Private Sector's Contribution*. Paris: OECD Publishing; 2021.
  27. O'Sullivan E, Andreoni A, Lopez-Gomez C, Gregory M. What is new in the new industrial policy? A manufacturing systems perspective. *Oxford Review of Economic Policy*. 2013;29(2):432-462.
  28. Pack H. Industrial policy in Europe in the 20th century. *EIB Papers*. 2006;11(1):36-62.
  29. Rodrik D. *Normalizing Industrial Policy*. Growth Commission Working Paper. Washington (DC): World Bank; 2007.
  30. Rodrik D. Pre-mature deindustrialization. *Journal of Economic Growth*. 2016;21(1):1-33.
  31. Rodrik D. Unconditional convergence in manufacturing. *Quarterly Journal of Economics*. 2013;128(1):165-204.
  32. Schmidt-Bleek F. Factor 10: The Future of Stuff. *Sustainability: Science, Practice and Policy*. 2008;4(1):1-4.
  33. Schmitz H. Collective Efficiency and Increasing Returns. *IDS Working Paper*. 1997;50.
  34. Singh G. *Impact Evaluation of Incentives on Industrialisation in Punjab - A Decadal Analysis*. Chandigarh: Institute for Development and Communication; 2021.
  35. Thirlwall AP. *The Nature of Economic Growth: An Alternative Framework for Understanding the Performance of Nations*. Cheltenham: Edward Elgar; 2002.
  36. United Nations, editor. *Industrial Development for the 21st Century: Sustainable Development Perspectives*. New York: United Nations; 2007.
  37. United Nations Industrial Development Organization (UNIDO), editor. *Demand for Manufacturing: Driving Inclusive and Sustainable Industrial Development*. Vienna: UNIDO; 2017.
  38. United Nations Industrial Development Organization (UNIDO), editor. *The Future of Industrialization in a Post-Pandemic World*. Vienna: UNIDO; 2021.
  39. Väilä T. No policy is an island-On the interaction between industrial and other policies. *EIB Papers*. 2006;11(2):8-33.
  40. Walton J. Theory and research on industrialization. *Annual Review of Sociology*. 1987;13(1):89-108.
  41. Yulek M. *Industrial Policy and Sustainable Growth*. New York: Springer; 2018.
  42. Kapparashetty S. Impact of MRTP Act for Development of Nation-A Study. *IJRAR-International Journal of Research and Analytical Reviews (IJRAR)*, E-ISSN. 2018 Apr 1:2348-1269.
  43. Rana A, Thakkar M. The Greening Imperative: How Indian States Are Promoting Sustainable Industry. *ORF Occas. Pap*. 2021;316.