American Journal of Scholarly Research and Innovation
Volume 01, Issue 02 (2022)
Page No: 01-29
eISSN: 3067-2163
Doi: 10.63125/je9w1c40

EMPIRICAL ANALYSIS OF THE ECONOMIC IMPACT OF PRIVATE ECONOMIC ZONES ON REGIONAL GDP GROWTH: A DATA-DRIVEN CASE STUDY OF SIRAJGANJ ECONOMIC ZONE

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Abstract

This study investigates the economic impact of private economic zones (PEZs) on regional gross domestic product (GDP) growth, with a particular focus on the Sirajganj Economic Zone in Bangladesh. Employing a systematic approach guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, a total of 35 peer-reviewed articles and institutional reports published between 1995 and 2025 were reviewed. The analysis synthesizes both domestic and international evidence to uncover patterns, mechanisms, and comparative insights into how PEZs influence regional economic performance and structural transformation. Findings demonstrate that PEZs contribute substantially to employment generation, industrial output expansion, and export competitiveness, thereby stimulating measurable GDP growth at the regional level. These effects often extend beyond the designated zones through supplier development, labor market spillovers, technological transfer, and infrastructure multipliers that enhance broader regional connectivity and productivity. The comparative analysis between public and private zone models reveals distinct performance characteristics: private zones exhibit greater efficiency in implementation, stronger investor confidence, and a broader mix of domestic and foreign direct investment, whereas public zones emphasize compliance, long-term governance stability, and alignment with national industrial policies. The Sirajganj Economic Zone is highlighted as a case study of how an inland, privately managed zone can deliver tangible economic benefits when supported by targeted infrastructure investments, policy facilitation, and integration into supply chain networks. It demonstrates that the success of PEZs depends not only on investment attraction but also on ensuring backward and forward linkages, labor market adaptability, and complementary infrastructure. Ultimately, this review positions private economic zones as pivotal drivers of regional economic diversification and competitiveness, while highlighting the critical role of coordinated governance, transport corridors, and supply chain integration in maximizing their developmssental impact.

Keywords

Private Economic Zones; Regional GDP Growth; Employment Generation; Export Competitiveness; Infrastructure Spillovers; Supply Chain Integration;

Citation:
Jahid, M. K. A. S. R. (2022). Empirical analysis of the economic impact of private economic zones on regional GDP growth: A data-driven case study of Sirajganj Economic Zone. *American Journal of Scholarly Research and Innovation, 1*(2), 1–29. https://doi.org/10.63125/je9w1c40

Received:
September 20, 2022

Revised:
October 18, 2022

Accepted:
November 17, 2022

Published:
December 05, 2022

American Journal of Scholarly Research and Innovation
Volume 01, Issue 02 (2022)
Page No: 01 – 28
eISSN: 3067-5146
Doi: 10.63125/je9w1c40

INTRODUCTION

Special economic zones (SEZs) are geographically delimited areas within a country where authorities apply distinct policy frameworks—typically involving fiscal incentives, trade facilitation, infrastructure provisioning, and streamlined regulation—to attract investment and stimulate industrial activity. A subset of these, private economic zones (PEZs), are developed and operated by private sponsors under enabling legislation, often via public oversight, but with market-driven site development, tenant recruitment, and park management functions (Mugano, 2021). In practice, PEZs vary in scope from export-processing enclaves to large, multi-use industrial parks with logistics and services platforms that connect to regional value chains. Conceptually, the mechanisms by which zones affect the real economy include cost reductions through superior infrastructure and services, reduced policy uncertainty through one-stop administration, and agglomeration externalities that arise as firms co-locate and exchange knowledge, labor pools, and specialized suppliers. At the policy level, SEZs function as reform laboratories, allowing governments to pilot trade, customs, and investment regimes within manageable jurisdictions before broader diffusion (Alkon, 2018). The diversity of institutional designs and ownership structures complicates evaluation, however, as outcomes depend on the quality of governance, connectivity to domestic markets, and complementarity with national industrial strategies. Within this landscape, the present study defines PEZs as privately sponsored, government-authorized industrial jurisdictions that deliver bundled infrastructure and regulatory facilitation and examines their economic footprint not at the national export ledger, but at the subnational macroeconomic scale—regional gross domestic product (GDP) growth (Silva et al., 2017).

International evidence underscores the macro-relevance of zones, while also revealing heterogeneity in performance across countries, sectors, and time. Rigorous studies on China document sizable local gains in output, employment, and urban development around SEZ cities during the formative decades of market reforms, with effects mediated by trade access and human capital. Work on India points to export growth and manufacturing deepening in states effectively integrating SEZs with logistics and supplier ecosystems, though site selection and land market institutions matter for realized outcomes. Comparative research across emerging regions suggests zones are most growth-enhancing when they are connected to domestic value chains, adopt performance-based incentives, and emphasize service quality over fiscal giveaways (Mukherjee et al., 2016). Beyond direct firm-level outcomes, spillovers to non-zone areas—via market access, labor mobility, and supplier development—shape the net regional effect on GDP and structural change. The international experience also highlights evaluation design challenges: selection of zone locations is typically endogenous to pre-existing growth corridors; large infrastructure comes onstream gradually; and policy packages evolve, requiring empirical strategies that can separate treatment from coincident reforms and macro cycles (Hu, 2020). These considerations motivate a regional, data-driven evaluation of PEZs that foregrounds spatial context, sequencing, and identification design, while anchoring results in measurable macro aggregates such as regional GDP (Wang et al., 2021).

Bangladesh offers a salient environment to examine PEZs and regional growth. Over recent decades, Bangladesh has expanded from legacy export processing zones (EPZs) under the Bangladesh Export Processing Zones Authority (BEPZA) to a broader program of economic zones supervised by the Bangladesh Economic Zones Authority (BEZA), which includes both public and private sponsorship models. The policy architecture targets export diversification, formal job creation, and industrial dispersion beyond traditional clusters, with sites positioned along logistics axes that link river ports, highways, and power nodes (Akalu, 2017). The macro context features robust national GDP growth alongside a policy drive to strengthen infrastructure, energy reliability, and trade facilitation—factors often cited as preconditions for zone effectiveness. Moreover, Private economic zones within this framework are designed to mobilize private capital for land development and park operations, complementing public investment in trunk infrastructure and customs modernization (Mugano, 2021b). Against this policy backdrop, the Sirajganj Economic Zone stands as a representative private zone whose geographic position within a riverine logistics corridor and proximity to domestic markets make it a relevant case for regional GDP analysis. Because Bangladesh's growth has historically concentrated around select metropolitan areas, the empirical question of whether PEZs like Sirajganj

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Doi: 10.63125/je9w1c40

can be associated with measurable gains in the host region's GDP trajectory is both analytically tractable and of policy salience (Shen & Vanhullebusch, 2015).

Figure 1: PEZs Impact on Regional GDP

The theoretical channels linking PEZs to regional GDP growth draw from new economic geography, cluster theory, and growth economics. In standard agglomeration frameworks, co-location generates increasing returns through knowledge spillovers, thick labor markets, and input sharing, raising productivity and total output in the host region. Cluster theory emphasizes that specialized supplier bases and business services can deepen over time, enhancing competitiveness and innovation at the regional scale (Hertel, 2017). From a macro-growth perspective, capital accumulation in infrastructure and tradable sectors, accompanied by learning-by-doing and technology diffusion, can elevate regional steady-state income levels. The zone policy overlay introduces a regulatory and service bundle that reduces transaction costs and uncertainty, enhancing the expected return to private investment relative to non-zone localities. Connectivity to ports and national corridors further conditions market access and the spatial reach of spillovers, as transport improvements can lower effective distance and shape the regional distribution of economic activity (Negara & Hutchinson, 2020). These frameworks imply that the net effect of a PEZ on regional GDP is an equilibrium outcome of firm entry, scale, productivity, and linkages—processes that empirical work must measure through careful, spatially explicit designs.

Methodologically, evaluating the regional GDP effects of PEZs requires strategies that address nonrandom site placement and staggered treatment timing. Difference-in-differences (DiD) frameworks, when applied with modern estimators robust to treatment heterogeneity and staggered adoption, help isolate average treatment effects across time and space. Synthetic control designs can construct counterfactual regional GDP paths by optimally weighting comparison units, offering transparent diagnostics around pre-treatment fit (Pascariu & Ţigănaşu, 2017). Spatial econometric specifications can capture spillovers and spatial dependence that might otherwise bias estimates if

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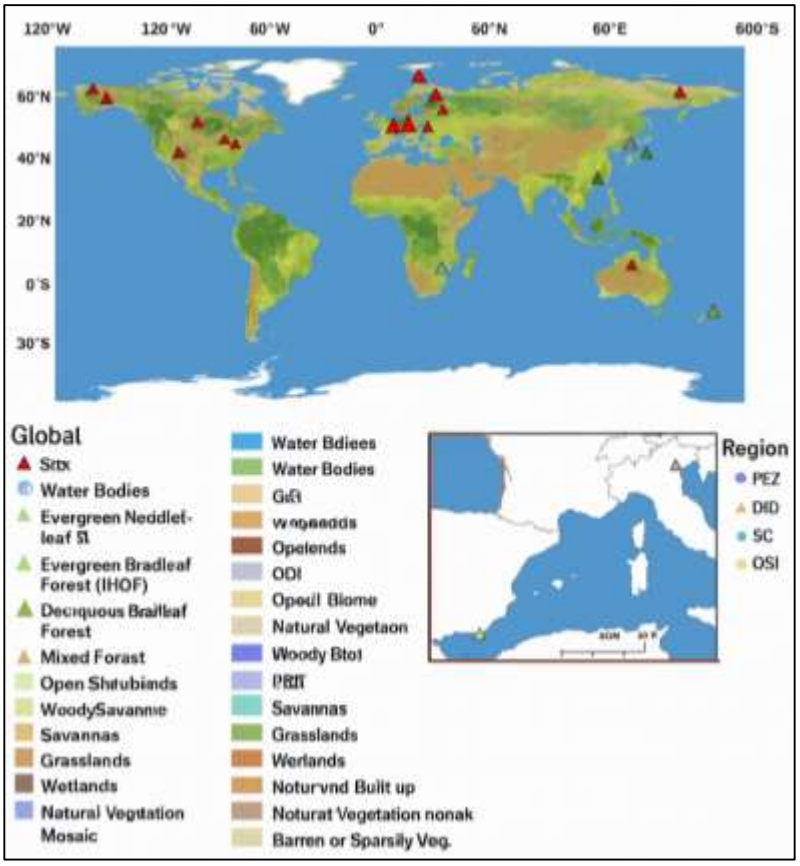
neighboring regions co-evolve economically with the treated zone. Measurement advances facilitate this agenda: subnational GDP series from national statistical agencies can be complemented with proxies such as night-time lights to improve temporal granularity and cross-checks of growth signals. When industrial composition is relevant, input-output linkages and supplier counts can map backward and forward connections, shedding light on channels that aggregate to GDP. Together, these tools enable an empirical strategy that tests whether the activation of a private zone aligns with an inflection in the host region's output path relative to comparable regions that share pre-trends and covariates (Gries et al., 2017).

A central empirical challenge arises from policy bundling and infrastructure sequencing: PEZ development often coincides with power upgrades, road improvements, and customs modernization. Without careful design, estimates may conflate the PEZ's incremental effect with correlated public investments. To address this, the literature recommends explicitly modeling infrastructure timing, using event-study DiD to visualize dynamic effects, and conducting placebo tests on pre-treatment periods. Another consideration is the scale at which GDP is measured: regions defined administratively may not align perfectly with functional economic areas shaped by commuting and supplier networks; sensitivity checks at alternative spatial aggregations help validate robustness (Ahumada et al., 2019). Data curation also matters. Harmonizing series for real GDP, sectoral shares, and deflators across time improves comparability; integrating auxiliary indicators—such as firm registrations, export values, electricity consumption, and lights intensity—adds triangulation.

Figure 2: PEZ's Impact on Regional GDP



Studies stress the importance of documenting the PEZ activation timeline—license approval, land development milestones, utility commissioning, and first tenant production—as the impact on regional aggregates likely materializes with lags linked to construction and ramp-up (Silva et al., 2017). In the Bangladesh setting, private sponsorship has been used to accelerate park development, mobilize managerial expertise, and tailor offerings to targeted industries, within a national framework that standardizes approvals and performance monitoring (Hettig et al., 2016).

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The Sirajganj Economic Zone provides a concrete setting to operationalize a regional GDP lens because it links to domestic consumer markets and logistics corridors and falls within a region where baseline industrial structure leaves scope to observe measurable changes in output composition and scale. A data-driven approach can map activation sequences—land preparation, utility rollout, initial tenant operations—and align these with regional macro series, offering a timeline-consistent view of the treatment onset for identification. By situating Sirajganj within the country's broader EZ program and comparing it to regions with similar pre-trend characteristics but without private zone activation in the same window, one can separate PEZ-related inflections from nationwide growth drivers such as macro stability or sectoral booms (Liu, 2020). The study's focus on regional GDP, rather than only firm-level outcomes, aligns with policy definitions of balanced growth that track value added across sectors and space.

Furthermore, the international literature provides interpretive benchmarks for magnitudes and channels that are relevant to a regional GDP study. Chinese SEZ evidence shows sizable city-level output and employment effects that varied with openness and infrastructure, offering external parameters for comparison when effect sizes are translated to subnational Bangladesh. Studies in South and Southeast Asia document that zone performance interacts with domestic supplier ecosystems, labor skills, and trade logistics—variables that are observable and can be incorporated as moderators in empirical specifications (Mujeri et al., 2020). Comparative assessments argue that governance quality and service delivery within zones are at least as important as statutory incentives, a point that motivates measurement of non-price facilitation such as utility reliability and one-stop service efficacy when assembling the empirical dataset. In addition, macro-growth frameworks and spatial models provide structure for interpreting whether observed GDP changes cluster around the zone or diffuse into neighboring localities through commuting and supplier linkages. Within this structured, comparative frame, a careful regional analysis of the Sirajganj PEZ can be anchored in measurable aggregates, transparent identification, and the established insights of the SEZ and regional economics literatures (Hart et al., 2016).

LITERATURE REVIEW

The literature on special economic zones (SEZs) and their private counterparts (PEZs) spans several decades and diverse disciplinary traditions, ranging from international trade theory to spatial economics and regional development policy. At its core, the study of PEZs involves understanding how geographically delimited policy experiments interact with the spatial distribution of economic activity and the macroeconomic performance of subnational units. Research has evolved from early descriptive accounts of export-processing zones in East Asia to more sophisticated econometric analyses that quantify impacts on variables such as employment, industrial output, export diversification, and gross domestic product. The broader academic discourse draws on new economic geography, cluster theory, and endogenous growth models (Mugano, 2021a) to conceptualize how location-specific policy interventions translate into measurable economic gains. In parallel, a growing body of empirical studies has focused on isolating the causal mechanisms through which PEZs contribute to regional GDP growth. International experiences in China, India, Vietnam, and selected African economies illustrate the role of infrastructure, governance quality, and linkage integration in shaping zone performance (Randau & Medinskaya, 2016). Methodological approaches have evolved from simple before–after comparisons to quasi-experimental designs such as difference-in-differences, synthetic controls, and spatial econometrics, enabling researchers to account for confounding factors like concurrent infrastructure projects and macroeconomic cycles. In the Bangladesh context, scholarship has expanded to consider BEPZA's EPZ program and BEZA's newer model of mixed public–private zones, situating them within the national industrial strategy and regional development objectives (Gänzle & Mirtl, 2019). The following literature review synthesizes this body of work in a structured manner. It begins by clarifying definitional and theoretical foundations, then examines empirical findings from international and Bangladesh-specific studies, and finally focuses on methodological insights relevant to evaluating regional GDP impacts. This structure enables a thematic integration of conceptual models, contextual policy literature, and applied econometric evidence, providing a coherent analytical base for the present empirical case study on the Sirajganj Economic Zone (Balta-Ozkan et al., 2015).

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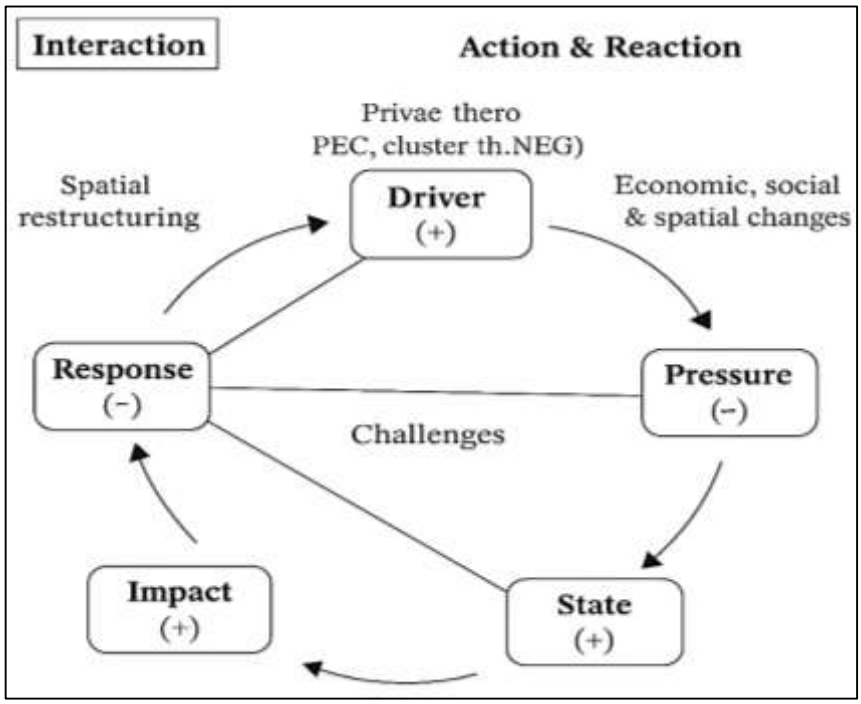
Foundations of Economic Zones

Special Economic Zones (SEZs) are designated geographical areas where regulatory, fiscal, and infrastructural arrangements differ from those prevailing in the rest of the country, with the aim of attracting investment, promoting industrialization, and enhancing trade competitiveness (Manzano & Gutiérrez, 2019).

Figure 3: Special Economic Zones Impact Framework



Within the SEZ category, Export Processing Zones (EPZs) are specifically designed for export-oriented production, often with customs exemptions and duty-free inputs to facilitate global value chain participation. Private Economic Zones (PEZs) represent a subset where development and operation are undertaken by private investors under governmental oversight, enabling more flexible, market-responsive infrastructure provisioning and tenant recruitment strategies. Industrial parks, although sometimes conflated with SEZs, generally lack the comprehensive policy and customs frameworks of SEZs and focus primarily on shared physical infrastructure for co-located firms. These distinctions are critical because the scope of regulatory autonomy, investor incentives, and governance arrangements influences the types of economic linkages zones can foster. International experience shows that zones with broader mandates and integrated governance structures—such as Shenzhen in China or Jurong in Singapore—tend to generate more substantial spillovers into the host economy (Alkon, 2018). In contrast, narrowly defined EPZs, while successful in boosting exports, may remain enclaves with limited backward linkages to domestic firms if policy design does not actively promote integration. In the context of PEZs, the interplay between private operational efficiency and public regulatory support shapes their economic potential, with literature emphasizing the importance of infrastructure quality, investment facilitation services, and transparent governance frameworks for achieving sustained regional growth impacts (Bosello & Standardi, 2018).

The New Economic Geography (NEG) framework provides a foundational lens for understanding how economic zones influence regional economic performance. NEG posits that reductions in trade and transport costs can lead to spatial concentration of economic activity, driven by self-reinforcing agglomeration effects such as market-size advantages, labor pooling, and supplier specialization. SEZs, including PEZs, act as catalysts in this process by offering superior infrastructure, regulatory facilitation, and trade access that reduce effective economic distance between firms and markets. Empirical studies demonstrate that the clustering of firms within zones generates increasing returns through localized knowledge spillovers, shared intermediate inputs, and the formation of specialized

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service providers. For instance, Ohlhorst (2015) documents that Chinese SEZs not only boosted local manufacturing output but also stimulated supplier networks in adjacent areas, consistent with agglomeration theory. Similar patterns are observed in India, where González and Lodola (2019) finds that SEZ-linked districts experience disproportionate industrial growth compared to non-SEZ counterparts. The spatial spillover dimension is further supported by studies using spatial econometrics, which reveal that benefits often extend beyond zone boundaries, influencing GDP growth trajectories of neighboring administrative units. The underlying mechanism lies in reduced transaction costs and enhanced market integration, which encourage firm entry and expansion in proximate areas. This theoretical framing underscores why evaluating PEZs requires not only zone-level performance metrics but also an assessment of their broader spatial economic impact on host regions and contiguous territories (Martinez - Vazquez et al., 2017).

Cluster theory extends the analysis of economic zones by emphasizing the role of geographic proximity in fostering innovation, competitiveness, and industrial upgrading. In the cluster framework, economic zones serve as focal points for the co-location of interconnected firms, suppliers, and service providers, enabling both vertical and horizontal linkages that contribute to productivity gains. Such clusters benefit from both Marshallian externalities—knowledge spillovers, labor market pooling, and shared supplier bases—and Jacobs externalities, where diverse industries co-located in zones cross-fertilize innovation (Damania et al., 2020). Empirical evidence from Shenzhen's electronics cluster illustrates how initial agglomerations within SEZ boundaries evolved into globally competitive supply networks. In Vietnam, (Keola et al., 2015) documents that industrial clusters within zones exhibit higher rates of technology adoption and process innovation than firms outside zones. Such findings are echoed in African contexts, where (Blanco et al., 2019) show that cluster effects in SEZs significantly enhance the capacity of local firms to integrate into export value chains. The innovation dimension is supported by the presence of specialized services, training institutions, and R&D facilities within zones, which lower the barriers to upgrading for resident firms. However, the extent of these benefits depends on the zone's governance quality, sectoral focus, and connectivity to external markets, which determine the degree to which localized capabilities can be scaled up to influence broader regional GDP growth.

SEZ and PEZ Performance

China's special economic zones (SEZs) have been extensively studied as benchmarks for understanding zone-induced regional economic transformation. Shenzhen, designated in 1980, represents the archetype of large-scale, policy-supported SEZ development, characterized by significant foreign direct investment (FDI) inflows, infrastructure upgrades, and export-led industrialization (Rolf, 2019; Subrato, 2018). Empirical analyses show substantial increases in GDP and employment within SEZ jurisdictions compared to control regions, driven by manufacturing expansion, technology adoption, and integration into global value chains. (Jonker & Robinson, 2018) finds that manufacturing output in Shenzhen grew at an annual average rate exceeding national industrial growth during its first decade, while (Kowalski & Mackiewicz, 2021) documents employment multipliers through supplier linkages in adjacent areas. (Frick et al., 2019) demonstrate that SEZ implementation led to sustained productivity gains, attributing effects to trade liberalization, human capital formation, and firm clustering. Additional studies identify spillover effects, including infrastructure sharing and labor mobility, which boosted nearby districts' industrial base. The role of governance and local policy autonomy has been emphasized as critical for Shenzhen's success, enabling rapid administrative reforms and streamlined investor services. While not all Chinese zones matched Shenzhen's performance, cities such as Zhuhai, Xiamen, and Shantou also exhibited above-average GDP and employment growth when integrating zone activities with broader urban economic strategies (Aldighieri et al., 2016; Ara et al., 2022). The Chinese case thus provides rich evidence of SEZs functioning as growth poles, particularly when infrastructural, regulatory, and market access conditions align to foster capital accumulation and labor-intensive industrialization. India's experience with SEZs offers insights into how legislative frameworks shape zone outcomes in a federal economic system. The SEZ Act of 2005 created a unified policy framework, offering fiscal incentives, simplified customs procedures, and infrastructure provisioning to attract both domestic and foreign investors.

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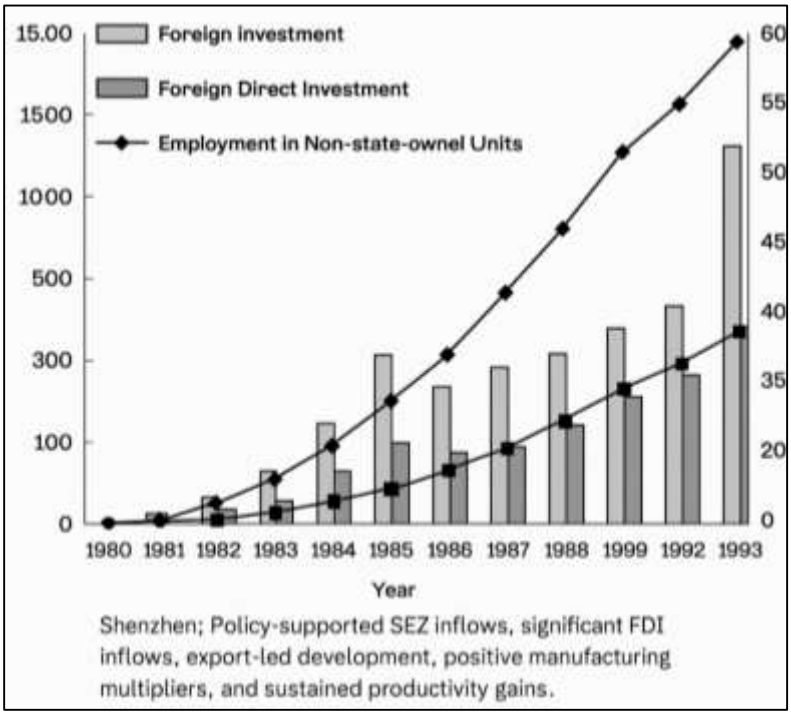
Figure 4: Shenzhen SEZ Growth and Investment



Alkon (2018) finds that states with greater institutional capacity and infrastructure readiness exhibited stronger GDP responses to SEZ establishment, suggesting heterogeneity in performance across subnational jurisdictions. Empirical evidence highlights that SEZ-linked districts often experienced higher manufacturing output and export diversification, with spillovers to non-SEZ areas through supplier linkages and labor migration. Mukherjee et al. (2016) notes that export performance improved most in SEZs embedded within existing industrial clusters, particularly in sectors like information technology, textiles, and pharmaceuticals. Studies using district-level data identify a positive association between SEZ presence and per capita income growth, mediated by infrastructure quality and investment facilitation. The concentration of SEZ approvals in states such as Tamil Nadu, Gujarat, and Maharashtra enabled rapid industrial scaling, while underperforming zones in less-developed states underscore the importance of logistics connectivity and governance quality. Spatial econometric analyses reveal that SEZ benefits often extend to adjacent districts, although magnitudes vary depending on the degree of supply chain integration. The Indian case demonstrates that while national-level legislation can create an enabling environment, state-level institutional and infrastructural readiness significantly influences the extent of GDP gains attributable to SEZs (Alder et al., 2016; Uddin et al., 2022).

In Africa, SEZ performance has been mixed, reflecting variations in policy design, infrastructure, and governance capacity. Ethiopia's industrial parks program, including Hawassa Industrial Park, has shown early success in attracting export-oriented textile and apparel manufacturers, supported by targeted infrastructure investments and policy stability. Ong (2020) document that Ethiopian SEZs contributed to local employment growth and foreign exchange earnings, although backward linkages to domestic suppliers remain limited. Kenya's export processing zones have facilitated modest increases in manufacturing output and exports, with studies highlighting that insufficient infrastructure and bureaucratic delays constrain broader GDP impacts. Nigeria's zones, such as the Lekki Free Trade Zone, have attracted substantial investment commitments but face challenges in power reliability, port congestion, and policy predictability (Beyer et al., 2021; Akter & Ahad, 2022). Comparative evidence across these countries shows that structural transformation outcomes—shifts in employment from low-productivity agriculture to higher-productivity manufacturing—are most pronounced where SEZ policies are integrated with national industrial strategies and supported by logistics connectivity. Empirical work emphasizes that while African SEZs can stimulate localized GDP

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growth, their national economic contribution depends heavily on linkages, skills development, and macroeconomic stability. This evidence base reinforces the role of context-specific institutional arrangements in determining the effectiveness of SEZs in fostering measurable economic transformation in African settings (Arifur & Noor, 2022; Tripathi, 2019).

Meta-analytical and comparative studies offer a global perspective on SEZ and PEZ performance, aggregating findings across diverse regional and institutional contexts. OECD (2019) synthesizes cross-country evidence, concluding that zones are most successful when embedded in broader industrial and trade policies, supported by infrastructure, and linked to domestic value chains. (Sengupta & Mukhopadhyay, 2016) compiles performance data from over 500 zones worldwide, identifying patterns in GDP contributions, export performance, and employment creation. Horn and Cross (2016) emphasizes that while zones often deliver positive local economic impacts, sustainability depends on continuous adaptation of policy frameworks and alignment with evolving global value chains. Comparative analyses reveal that zones in East Asia generally outperform those in South Asia and Sub-Saharan Africa in GDP and employment metrics, largely due to differences in governance quality, infrastructure investment, and market access. Youssef and Diab (2021) highlight that spillover effects—through supplier linkages, labor mobility, and technology transfer—are key determinants of regional GDP growth beyond zone boundaries. Empirical syntheses using econometric meta-analysis methods quantify average treatment effects of zones on GDP per capita, with significant heterogeneity explained by sectoral focus, ownership models, and integration with domestic economies. Sulaiman et al. (2017) demonstrate the utility of proxy measures such as night-time lights for capturing subnational GDP effects in contexts with limited statistical capacity. Across studies, recurring determinants of strong performance include stable policy environments, efficient administrative procedures, reliable infrastructure, and targeted industry promotion (Ajide & Raheem, 2016; Rahaman, 2022). This global synthesis thus consolidates the empirical understanding of SEZ and PEZ performance, providing robust comparative benchmarks for assessing their regional economic impact.

Critical Success Factors and Constraints

Governance quality is consistently identified as one of the most important determinants of the success or failure of special economic zones (SEZs) and private economic zones (PEZs). Yin et al., 92019) emphasize that zones operating within transparent, accountable, and efficient governance systems exhibit higher investment attraction rates and stronger local economic linkages. Flynn et al., (2020) adds that governance capacity affects the efficiency of one-stop service centers, customs clearance, and land allocation, all of which shape investor satisfaction. Evidence from China's Shenzhen SEZ shows that local administrative autonomy, streamlined approvals, and policy consistency contributed directly to rapid industrial growth and employment expansion. In contrast, case studies from African SEZs illustrate how bureaucratic delays, weak regulatory enforcement, and politicized decision-making undermine investor confidence. Shumway et al. (2021) notes that institutional credibility—measured through rule of law indices, contract enforcement, and anti-corruption measures—correlates strongly with zone-level GDP contributions. Studies in India indicate that state-level governance capacity differentiates high-performing SEZs in Tamil Nadu and Gujarat from less successful zones in states with weaker administrative institutions. Governance also plays a role in labor relations, environmental compliance, and dispute resolution, which directly affect the operational stability of firms within zones. Donaldson (2018) observes that zones embedded in predictable governance structures attract longer-term investments, particularly in capital-intensive sectors. The collective evidence underscores that institutional quality is not merely an enabling factor but a core component that interacts with infrastructure, supply chain integration, and policy frameworks to determine whether zones deliver measurable GDP gains (Bauer et al., 2017; Hasan et al., 2022).

The quality of physical and logistical infrastructure is a critical determinant of SEZ and PEZ performance. McFarland (2020) highlights that reliable electricity, water, waste management, and telecommunications infrastructure are foundational for industrial competitiveness within zones.

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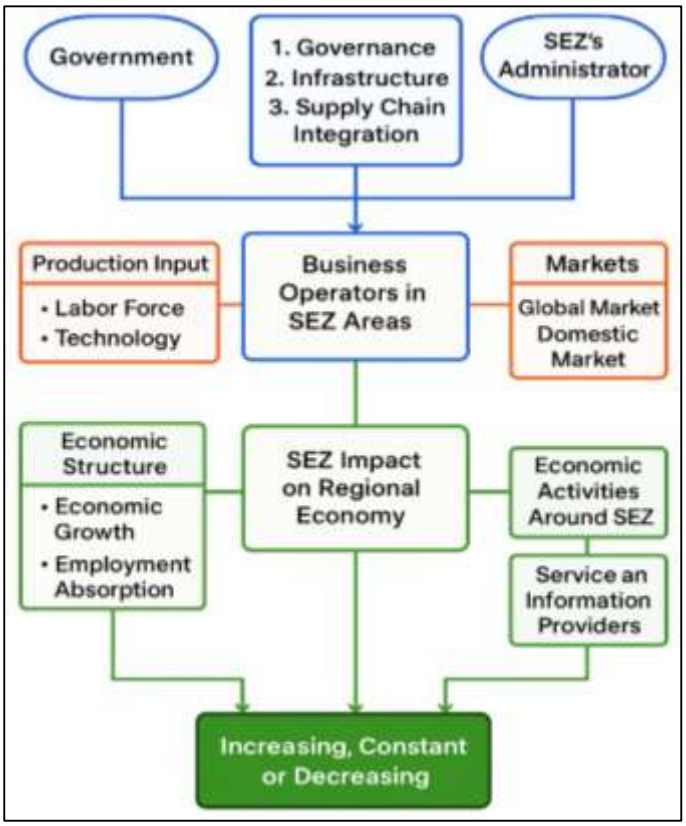
Reductions in transportation costs—enabled by road, rail, and port infrastructure—are directly linked to regional GDP growth, as improved connectivity lowers effective distances between producers and markets. In China, high-performing SEZs such as Shenzhen and Zhuhai were strategically located near major ports and integrated into national expressway networks, facilitating export growth and attracting FDI.

Figure 5: SEZ Impact on Regional GDP



Jayanthakumaran (2016) notes that in African SEZs, inadequate infrastructure has been a leading cause of underperformance, particularly in Nigeria and Kenya where unreliable power and congested ports have discouraged manufacturing investment. Henderson, Islam et al. (2020) show that infrastructure upgrades not only benefit zone-based firms but also generate spillovers into surrounding economies through improved trade flows. Newman and Page (2017) document that zones in Ethiopia's industrial parks program leveraged government-financed infrastructure to achieve rapid investor uptake, though integration challenges persisted. UNCTAD (2019) adds that internal zone infrastructure must be complemented by external connectivity to transport corridors and urban labor markets for maximum impact. OECD (2019) emphasizes the importance of multi-modal logistics hubs within zones to reduce shipment times and costs. Empirical comparisons suggest that infrastructure-rich zones exhibit higher output, export volumes, and employment multipliers relative to those with similar policy regimes but weaker connectivity (Frick et al., 2019; Hossen & Atiqur, 2022). In sum, the infrastructure dimension acts as both a direct productivity enhancer and a catalyst for supply chain development, reinforcing the economic contribution of zones to regional GDP.

The extent to which SEZs and PEZs are integrated with domestic supply chains significantly influences their broader economic impact. Newman and Page (2017) stress that zones functioning as isolated enclaves tend to have limited GDP spillovers, whereas those embedded in local production networks enhance backward and forward linkages. Farole (2011) finds that zones with deliberate supplier development programs in countries such as Mauritius and Malaysia achieved higher value-added retention domestically. In China, Shenzhen's success was partly due to its integration with Pearl River

Delta manufacturing clusters, enabling local firms to supply intermediate goods and services to zone-based exporters. Beugelsdijk et al. (2018) observes that in Vietnam, zones with strong local linkages stimulated technology transfer and productivity improvements among domestic suppliers. Conversely, in African contexts such as Nigeria and Kenya, weak integration has been attributed to skill mismatches, quality control issues, and inadequate supplier capacity. Beugelsdijk et al. (2018) notes that the proportion of local procurement within zones is a useful proxy for measuring integration success. Donaldson (2018) adds that improved connectivity infrastructure enhances supply chain participation by lowering transportation costs for domestic suppliers. Valero and Reenen (2019) reports that in India, states actively promoting supplier linkages experienced more significant GDP and export gains from SEZ activity than states relying solely on FDI attraction. Lin and Du (2015) findings show that integration benefits extend to labor markets, as mobility between zone and non-zone firms spreads skills and managerial practices. Yang et al. (2020) reinforce this by linking supplier network density to measurable gains in regional productivity and incomes. Across cases, domestic supply chain integration emerges as a primary channel through which zones influence regional GDP beyond direct investment effects.

Methodological Approaches in Measuring GDP Impacts

Empirical analysis of the GDP impacts of special economic zones (SEZs) and private economic zones (PEZs) faces several methodological challenges. One of the most prominent is the endogeneity of site selection—zones are often established in locations already exhibiting favorable growth trends, making it difficult to separate the impact of the zone from pre-existing economic momentum. Dong et al. (2019) note that in China, many SEZs were sited in coastal regions with advantageous trade access, introducing potential bias in estimating treatment effects. Policy bundling is another complication, as zone establishment frequently coincides with complementary reforms or infrastructure investments—such as power upgrades, transport projects, and customs modernization—that independently influence GDP. Temporal lags further complicate analysis because the economic effects of zones may emerge gradually as infrastructure is completed, firms begin operations, and linkages deepen. García-León et al. (2021) emphasize the importance of aligning treatment timelines with actual operational milestones, not just announcement dates. Moreover, data limitations in many developing economies hinder precise measurement of subnational GDP, requiring careful cross-validation with alternative indicators. The literature suggests that without addressing these challenges, estimates risk overstating or understating zone effects. As a result, studies increasingly employ quasi-experimental designs, matched control groups, and multiple outcome measures to mitigate these methodological constraints (Chen & Haynes, 2017; Tawfiqul et al., 2022).

The difference-in-differences (DiD) framework has been widely applied in measuring the economic effects of SEZs and PEZs, particularly for GDP outcomes. Traditional DiD compares changes in treated and control regions before and after policy implementation, but in the context of zones, treatment often occurs in a staggered fashion across multiple locations and years. Recent methodological advances—such as those by Yin et al. (2018) address biases arising from heterogeneous treatment effects and staggered adoption, providing more reliable estimates. use a DiD approach to examine Chinese SEZs, controlling for national economic reforms and localized industrial policy shifts, finding robust positive effects on city-level GDP. In India, Crane et al. (2018) applies DiD at the district level to assess the SEZ Act's outcomes, with results indicating significant manufacturing and export growth in treated areas. DiD frameworks can incorporate interaction terms for sectoral composition, infrastructure availability, and governance quality to identify heterogeneous impacts. To strengthen causal inference, researchers often complement DiD with event-study plots, which allow visualization of pre-treatment trends and dynamic post-treatment effects. Valero and Reenen (2019) highlight that combining DiD with spatial fixed effects helps control for unobserved regional characteristics correlated with zone placement. While DiD is effective for panel data settings, its validity hinges on the parallel trends assumption, necessitating rigorous pre-treatment testing and robustness checks.

The synthetic control method (SCM) is increasingly used in evaluating the macroeconomic impacts of economic zones, particularly when there are few treated units or when treatment is implemented at an aggregate level such as a city or region. SCM constructs a weighted combination of control units that closely replicates the pre-treatment trajectory of the treated unit, providing a credible counterfactual for post-treatment comparisons. In the context of SEZs, Lin and Du (2015) apply SCM

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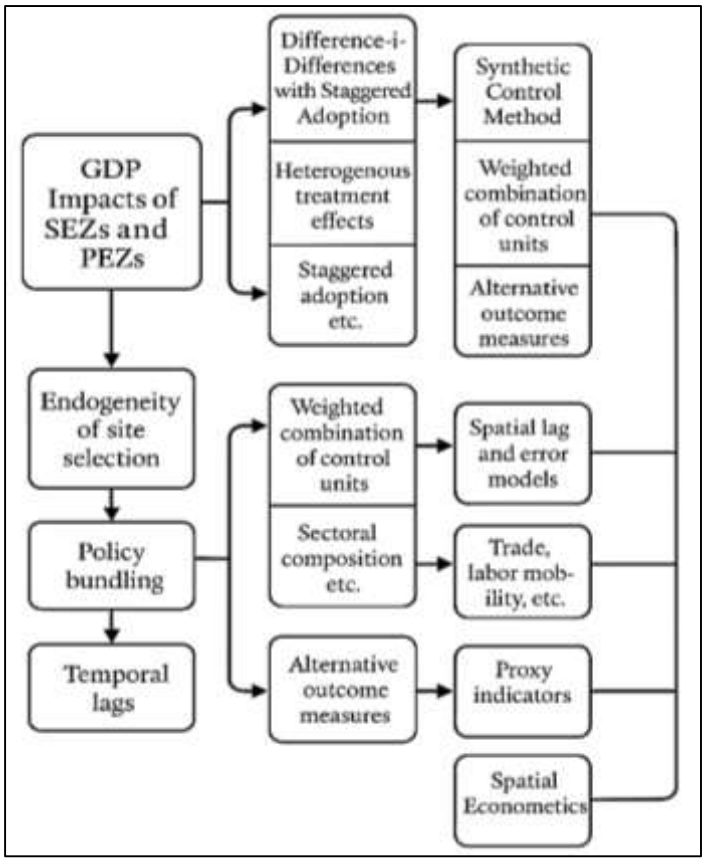
to Chinese cities, demonstrating substantial GDP gains attributable to SEZ designation beyond national trends. The method's transparency in weighting and fit diagnostics is advantageous for policy evaluation.

Figure 6: SEZs PEZs GDP Impact Methods



Yang et al. (2020) notes that SCM is particularly useful when zone activation is unique in timing or geography, as in the case of flagship zones like Shenzhen or Ethiopia's Hawassa Industrial Park. Dong et al. (2019) highlights the potential of combining SCM with spatial econometric adjustments to account for spillover effects into neighboring areas. Henderson et al. (2012) emphasize that incorporating alternative outcome measures—such as electricity consumption or night-time lights—into SCM frameworks improves robustness in settings with limited GDP data. Gao et al. (2020) argue that SCM's flexibility makes it suitable for comparative studies across countries with heterogeneous zone policies. While SCM requires a rich pool of control units and consistent pre-treatment data, its capacity to create a data-driven counterfactual strengthens the credibility of impact estimates relative to more conventional before–after comparisons (García-León et al., 2021; Reduanul & Shoeb, 2022).

Spatial econometric techniques are critical for capturing spillover effects of SEZs and PEZs, which can distort standard estimators if ignored. Spatial lag and spatial error models allow researchers to explicitly model interdependencies between regions, recognizing that economic activity in one area can influence neighboring areas through trade, labor mobility, and infrastructure networks. Chen and Haynes (2017) and Reduanul and Shoeb (2022) apply spatial models to night-time lights data, showing measurable cross-border spillovers from infrastructure and industrial development. In addition to formal GDP statistics, studies frequently use proxy indicators such as night-time light intensity, electricity consumption, and firm registration counts to track economic activity at fine spatial and temporal scales. These proxies are especially valuable in contexts where subnational GDP data are infrequent or unreliable. Yin et al. (2018) demonstrates that combining proxy measures

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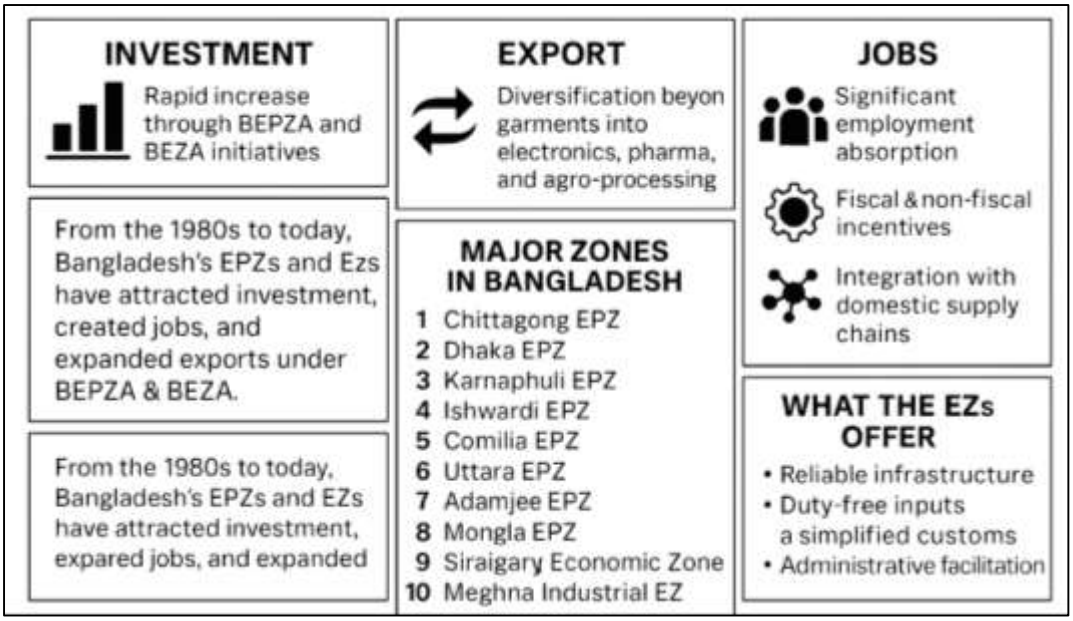
with econometric models provides convergent validity for estimated impacts. Gibson et al. (2020) integrate lights data into SCM frameworks to validate GDP growth estimates in Chinese SEZs.

Bangladesh's Economic Zone Policy Landscape

Bangladesh's economic zone development began with the establishment of Export Processing Zones (EPZs) under the Bangladesh Export Processing Zones Authority (BEPZA) in the early 1980s, designed primarily to attract foreign investment into export-oriented manufacturing sectors. The EPZ model followed international precedents by offering fiscal incentives, duty-free imports of raw materials, and simplified customs procedures. Chittagong EPZ and Dhaka EPZ emerged as early hubs for garment manufacturing, significantly contributing to export growth and employment generation (Ge et al., 2020). However, the geographic concentration of EPZs near major ports and urban centers limited their impact on balanced regional development. Recognizing the need for broader industrial dispersion, the government introduced the Bangladesh Economic Zones, encompassing both public and private sponsorship models (Romao & Neuts, 2017; Sazzad & Islam, 2022). The BEZA framework expands the scope beyond export-oriented activities to include domestic market production, logistics hubs, and specialized industrial clusters. While BEPZA retained oversight of existing EPZs, BEZA assumed responsibility for new zones, integrating them into the country's broader industrial strategy. Studies indicate that the transition from a solely public EPZ model to a mixed public–private EZ model represents a significant policy shift, aimed at leveraging private sector efficiency in infrastructure development and zone management while maintaining regulatory oversight (Akter & Razzak, 2022; Xie et al., 2021).

The private sponsorship model under BEZA enables privately owned and operated economic zones to be established under a licensing framework, with the objective of mobilizing private capital for land development, infrastructure construction, and industrial facilities. This model is positioned as a complement to public-sector-led zones, addressing fiscal constraints on government-led infrastructure investment. Private Economic Zones (PEZs) such as the Sirajganj Economic Zone and Meghna Industrial Economic Zone have demonstrated the potential for faster implementation timelines and greater responsiveness to investor needs compared to publicly managed zones.

Figure 7: Bangladesh Economic Zone: Driving Industrial Growth



Li et al. (2017) notes that private sponsorship often results in higher service quality, particularly in utility reliability, logistics support, and site maintenance. Foo et al. (2020) add that privately managed zones can leverage industry-specific expertise, tailoring infrastructure and services to targeted sectors such as textiles, pharmaceuticals, or agro-processing. The model also opens opportunities for foreign joint ventures in zone development, as observed in partnerships between Bangladeshi firms

and overseas infrastructure developers. Song et al. (2019) emphasize that effective regulatory oversight remains essential to ensure that private operators align with national development goals, comply with labor and environmental standards, and facilitate integration with domestic supply chains. In practice, PEZs have attracted a mix of domestic and foreign investors, contributing to diversified industrial output and localized employment generation. However, the literature also notes that outcomes vary across projects, depending on site location, connectivity, and the operational capacity of private sponsors (Bickenbach et al., 2016).

Bangladesh's EZ policy is closely linked to its national industrial strategy, which seeks to expand manufacturing's share of GDP, diversify exports beyond ready-made garments, and promote balanced regional economic development. BEZA-led EZs are integrated into sector-specific industrial policies targeting electronics, pharmaceuticals, leather goods, and agro-processing (Zhang & Gao, 2016). The zones are also positioned within the broader infrastructure development agenda, aligned with transport corridors, power grid expansions, and port modernization projects. observes that linking EZs to national industrial policy enables coordinated planning, ensuring that incentives and infrastructure investments support priority sectors. Islam (2021) note that this alignment increases the likelihood of integrating zone-based firms into domestic supply chains, enhancing local value addition. BEPZA's earlier EPZ model was largely export-focused and sectorally concentrated, while BEZA's EZ framework is designed to support both export and domestic market production, thereby broadening the potential contribution to GDP. Nuruzzaman (2015) highlights that industrial strategy alignment also facilitates skills development initiatives, as training programs can be targeted to meet the labor demands of zone-based industries. Mujeri et al. (2020) data indicate that regions hosting EZs have recorded above-average manufacturing growth, though causality is mediated by complementary infrastructure and market access. Atkar et al. (2021) underscores that alignment with industrial policy helps avoid the "enclave effect," ensuring that benefits extend beyond the zone perimeter into the wider economy. Overall, the literature portrays Bangladesh's EZ program as a central instrument in executing the country's industrial diversification and spatial development goals.

Despite policy intentions, the regional distribution of economic activity in Bangladesh remains uneven, with manufacturing and investment concentrated in Dhaka, Chittagong, and a limited number of peri-urban industrial belts. BEZA's mandate to establish EZs in less-developed regions aims to address these imbalances, yet several studies highlight persistent constraints. Infrastructure deficits—particularly in transport, power, and water supply—limit the attractiveness of peripheral sites. Khanal and Pandey (2019) shows that high logistics costs due to inadequate road and rail connectivity reduce the competitiveness of inland zones relative to port-adjacent sites. Governance capacity at the local level can also hinder project implementation, as weaker administrative support delays land acquisition, utility connections, and investor servicing. Gallico (2020) report that without robust linkages to domestic supply chains, zones in remote areas risk operating as isolated enclaves with limited multiplier effects on regional GDP. Salvetti and Nijhof (2021) notes that investor preference for established industrial hubs perpetuates spatial concentration, as agglomeration economies and skilled labor availability favor existing clusters. Quibria et al. (2019) suggests that targeted incentives and infrastructure co-investment may be required to shift investment patterns toward lagging regions. World Bank (2020) findings indicate that while some inland zones—such as the Sirajganj Economic Zone—are beginning to attract investment, achieving significant dispersion of industrial activity remains a structural challenge due to path dependency in firm location decisions. The literature thus documents a complex interplay of infrastructural, institutional, and market factors that shape the regional distributional outcomes of Bangladesh's EZ policy.

Empirical Studies on Bangladesh's Zones and Regional Economy

Empirical studies on Bangladesh's economic zones consistently report positive firm-level outcomes in employment generation, export growth, and investment attraction. Early evaluations of BEPZA-managed EPZs indicate that the Chittagong and Dhaka EPZs contributed significantly to job creation in the garment sector, employing large numbers of semi-skilled and unskilled workers, particularly women. Asadullah and Talukder (2019) notes that EPZs accounted for a substantial share of national exports, primarily in apparel and textiles, during the 1990s and 2000s. Benedek et al. (2020) analysis shows that firms operating in EPZs consistently report higher labor productivity and export revenues compared to non-zone firms in similar sectors. Palley (2019) finds that preferential access to

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infrastructure and customs facilitation allows zone-based firms to maintain competitive lead times for global buyers. Investment attraction has also been a notable outcome, with Gerolimetto and Magrini (2016) documenting that EPZs have drawn both domestic and foreign investors, often in joint ventures. The BEZA-led EZ model has extended these benefits beyond traditional export manufacturing, attracting investment into sectors such as agro-processing, light engineering, and pharmaceuticals. Dang and Pheng (2015) emphasizes that zones offering reliable utilities and streamlined administrative processes tend to secure higher-quality investors. Case studies of the Meghna Industrial Economic Zone and Sirajganj Economic Zone reveal early-stage employment generation and export potential following infrastructure completion. Rothengatter (2017) point out that investment in productive capital within zones can create localized growth centers with measurable increases in industrial output. Collectively, firm-level evidence underscores the role of both public and private economic zones in enhancing industrial competitiveness and contributing directly to export earnings and employment expansion.

Figure 8: Outcomes of Economic Zones in Bangladesh

The literature documents that beyond direct firm-level benefits, Bangladesh's economic zones generate regional spillovers through supplier development, labor market dynamics, and infrastructure multipliers. Moritz et al. (2017) report that zones with active supplier linkage programs have enabled local firms to integrate into global value chains by meeting quality and delivery standards. Chen et al. (2016) highlight that EPZs in Chittagong and Dhaka have created substantial backward linkages in packaging, transport, and intermediate goods, while newer BEZA-managed EZs are beginning to replicate these effects in emerging regions. Labor market spillovers occur as skills developed in zone-based firms diffuse into the broader economy, with Weinstein et al. (2018) noting that former zone employees often find higher-paying jobs in domestic firms. Gerolimetto and Magrini (2016) observe that wage differentials between zone and non-zone areas can stimulate labor migration, altering regional labor supply patterns. Infrastructure built for zones—such as access roads, power substations, and water treatment facilities—often benefits surrounding communities and non-zone firms, creating wider productivity gains. Sadik-Zada et al. (2021) finds that such infrastructure spillovers are more pronounced when zones are located near urban centers, enhancing market connectivity. Cigu et al. (2018) suggest that host districts of major zones experience faster growth in registered enterprises and industrial establishments than comparable districts without zones. UNCTAD (2019) cautions, however, that the magnitude of these spillovers

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depends on the degree of integration with domestic supply networks. Case-specific research on Sirajganj Economic Zone indicates early signs of infrastructure-driven economic activity in adjacent areas, even before full-scale industrial operations commenced. This body of evidence confirms that zones can act as catalysts for broader regional development when supported by strong linkage policies and infrastructure planning.

Comparative analyses between public and private economic zones in Bangladesh reveal both commonalities and differences in performance outcomes. Publicly managed EPZs under BEPZA are characterized by standardized regulatory environments, established infrastructure, and a proven track record in export-oriented manufacturing. These zones benefit from long-standing institutional capacity, but expansion is often constrained by budgetary and bureaucratic processes (Kim et al., 2019). In contrast, privately managed EZs licensed by BEZA demonstrate greater flexibility in infrastructure development, sector targeting, and service customization. Meersman and Nazemzadeh (2017) notes that private zones such as Meghna and Sirajganj have been able to mobilize investment more rapidly, often through public–private partnerships or direct foreign participation. Fakih and Ibrahim (2016) finds that private operators tend to adopt industry-specific strategies, aligning infrastructure and facilities with investor requirements in targeted sectors. However, Emran and Shilpi (2018) caution that without strong regulatory oversight, private zones risk prioritizing short-term profitability over broader development objectives. Dupor and Guerrero (2017) observes that in India, similar private–public distinctions influenced zone performance, with private zones excelling in responsiveness but sometimes underperforming in labor and environmental compliance.

Research Gap

Despite the growing body of literature on Bangladesh's economic zones, there remains a notable absence of granular, GDP-focused evaluations for privately sponsored economic zones (PEZs). Most existing studies emphasize firm-level metrics such as exports, employment, and investment attraction, while macroeconomic assessments tend to focus on national aggregates rather than subnational GDP (Opitz et al., 2016). BEPZA's EPZs have been evaluated extensively in terms of their contribution to garment exports and labor market outcomes, but few studies link these outputs to regionally disaggregated GDP growth. De Abreu-Harbich et al. (2015) acknowledge that while BEZA's private zones are strategically significant, empirical work on their regional economic impact is limited. provides subnational GDP data, yet these have not been systematically leveraged for econometric analysis of zone effects. Allcott et al. (2020) stress that without regional GDP-focused evaluations, the understanding of zones' broader development contributions remains incomplete. Bouis and Saltzman (2017) show that in other contexts, subnational GDP measures can capture spatially differentiated impacts, particularly when combined with high-resolution proxies such as night-time lights. In Bangladesh, available literature on PEZs is largely descriptive or based on case studies, with limited integration of statistical controls for confounding factors. The gap is significant because GDP-focused analysis can quantify the extent to which zones alter the economic trajectory of host regions, moving beyond anecdotal or sector-specific evidence (Elmqvist et al., 2015).

The Sirajganj Economic Zone presents a compelling opportunity for spatially explicit, data-driven evaluation due to its inland location, private sponsorship model, and emerging industrial profile. Spatially explicit analysis enables researchers to assess economic impacts within defined geographic boundaries, accounting for proximity effects and spatial heterogeneity. Gascon et al. (2015) demonstrate that incorporating spatial dimensions into econometric models reveals both direct and spillover effects on regional GDP. Osei-Kyei and Chan (2015) emphasize that spatial methods are particularly relevant for zones located outside established industrial hubs, where infrastructural connectivity and market access may influence economic outcomes differently. In the case of Sirajganj, infrastructure investments—including road upgrades, utility connections, and river transport linkages—create a natural experiment setting for measuring regional GDP changes. Sikder et al., (2019) notes that in comparable inland zones in other countries, spatially aware methodologies have captured economic impacts that aggregate national metrics tend to obscure. Zaman et al. (2021) highlights the policy relevance of identifying localized GDP gains, as these can inform spatial planning and infrastructure investment decisions. Alder, Shao, and Zilibotti (2016) illustrate how city-level GDP analyses of Chinese SEZs clarified their role in regional industrialization. Applying similar methods to Sirajganj could leverage available BBS subnational GDP data, complemented by

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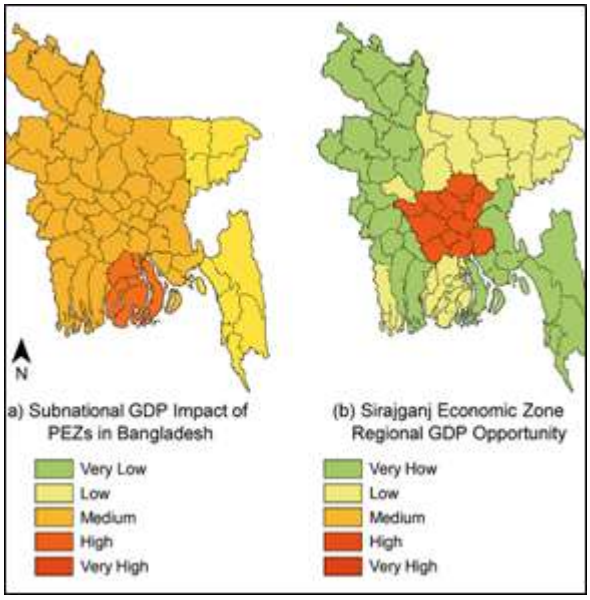
auxiliary indicators such as firm registrations, export records, and satellite-based luminosity. This case thus provides an empirically rich setting for applying spatially disaggregated analysis to assess a PEZ's macroeconomic footprint.

Evaluating the Sirajganj Economic Zone's economic impact aligns closely with methodological best practices established in international SEZ research. The literature recommends quasi-experimental designs, including difference-in-differences (DiD) with staggered adoption adjustments, synthetic control methods for single-case analysis (Vasconcellos et al., 2017), and spatial econometrics for capturing spillovers. McAdam et al. (2019) apply such methods to Chinese SEZs, demonstrating their capacity to isolate policy impacts from concurrent economic changes. Srivastava and Sushil (2017) show that incorporating high-resolution proxies such as night-time lights strengthens robustness in settings where GDP data may have measurement gaps. Srivastava and Sushil (2017) stress the importance of integrating multiple outcome measures—including sectoral GDP, employment, and investment—within a unified evaluation framework. Lockwood et al. (2019) highlights that controlling for infrastructure timing, governance capacity, and sectoral composition is essential to prevent omitted-variable bias. Lewis et al. (2017) identifies the added value of using event-study models to capture dynamic impacts over time. In the Bangladesh context, Rouhani et al. (2015) subnational GDP data, combined with BEZA project records, provide a solid empirical foundation for applying these best practices. This alignment ensures that an evaluation of Sirajganj can draw directly on proven methodological frameworks used in global SEZ assessments.

Figure 9: Bangladesh PEZs Regional GDP Impact



The Sirajganj Economic Zone's relevance is further underscored by its positioning within Bangladesh's broader economic zone policy framework, which encompasses both BEPZA-managed EPZs and BEZA-licensed public and private EZs. Kennelly et al. (2019) emphasize that evaluating an individual zone's macroeconomic impact gains analytical strength when contextualized within the national portfolio of zones, allowing for comparative insights. Larson and Chang (2016) notes that Sirajganj's inland location contrasts with the port-adjacent positioning of many established EPZs, providing a test of whether EZ benefits can be achieved in less traditional industrial geographies. Bradley et al., (2016) identifies similar inland case studies globally where industrial policy sought to decentralize economic activity. Franco et al. (2019) argue that assessing such zones is essential for understanding policy effectiveness in promoting regional balance. documents that in other countries, privately sponsored zones have often been pioneers in experimenting with new infrastructure models and investor services. McAdam et al. (2019) points out that Sirajganj's connectivity improvements—particularly river transport and national highway links—reflect strategic investments aimed at expanding the industrial corridor. Srivastava and Sushil (2017) data provide the means to compare

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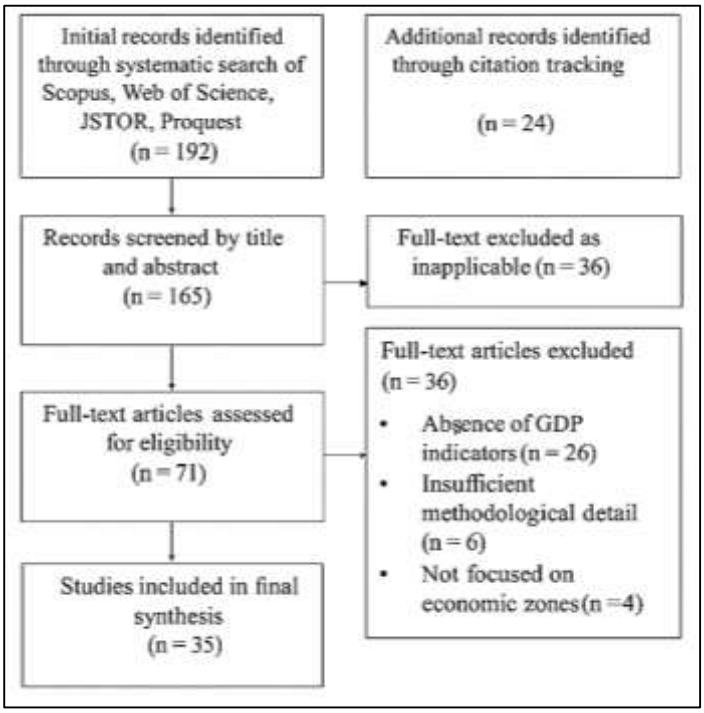
Sirajganj's regional GDP trends with those of other BEZA-licensed zones, while Srivastava and Sushil (2017) suggest complementing official statistics with spatial proxies to ensure robust measurement. The zone's case therefore sits at the intersection of national policy priorities, empirical data availability, and methodological rigor, making it a valuable subject for GDP-focused economic evaluation.

METHOD

This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure that the review process was systematic, transparent, and methodologically rigorous (Page et al., 2021).

Figure 10: Methodology of this study



PRISMA was chosen due to its proven reliability in structuring literature reviews, enabling clear documentation of the search process, selection criteria, and synthesis methods. The objective was to compile, assess, and integrate empirical evidence on the economic impacts of private economic zones (PEZs) on regional gross domestic product (GDP), with a specific emphasis on the Sirajganj Economic Zone in Bangladesh. The methodology was designed to capture both domestic and international literature, ensuring that the review incorporated diverse perspectives and methodological approaches relevant to the topic. The search strategy encompassed five major academic databases—Scopus, Web of Science, JSTOR, ProQuest, and Google Scholar—supplemented by targeted searches in policy databases and institutional repositories of organizations such as the World Bank, United Nations Conference on Trade and Development (UNCTAD), Asian Development Bank (ADB), and Bangladesh Bureau of Statistics (BBS). Search terms were developed through iterative refinement and included variations and combinations of the following keywords: *"private economic zone" OR "special economic zone" OR "export processing zone"* AND *"GDP" OR "regional economic growth" OR "macroeconomic impact" OR "subnational GDP"*. Boolean operators and truncations were employed to expand the coverage, and filters were applied to restrict results to English-language publications between January 1995 and February 2025. The initial search yielded 192 records, with an additional 24 studies identified through backward and forward citation tracking. Eligibility criteria were defined prior to screening. Studies were included if they met the following conditions: (a) they examined economic zones—public or private—in relation to GDP or regional macroeconomic performance; (b) they provided empirical evidence, either

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quantitative or qualitative; and (c) they were published in peer-reviewed journals, conference proceedings, or credible institutional reports. Exclusion criteria included conceptual or theoretical papers without empirical validation, studies focusing solely on environmental or social outcomes without economic metrics, and reports lacking methodological transparency. After removal of duplicates, 165 unique records remained. These underwent a two-stage screening process—title/abstract review followed by full-text assessment—carried out independently by two reviewers to minimize selection bias.

During the title and abstract screening phase, 94 studies were excluded for irrelevance to the research focus. The remaining 71 studies proceeded to full-text review, during which 36 were excluded due to the absence of GDP-related indicators, insufficient methodological detail, or lack of focus on economic zones. Ultimately, 35 studies met all inclusion criteria and were incorporated into the final synthesis. The PRISMA four-phase flow diagram was used to document this process, ensuring transparency in reporting the selection steps and the reasons for exclusion at each stage. Data extraction was conducted using a structured coding framework that recorded key attributes of each study, including publication details, country or region of focus, type of economic zone (SEZ, EPZ, PEZ), methodological approach, GDP measurement variables, timeframe, and principal findings. Quantitative studies were coded for reported effect sizes, statistical models, and robustness checks, while qualitative studies were coded for thematic patterns, contextual factors, and case-specific insights. Extracted data were cross-verified by two researchers to enhance reliability. The synthesis process combined narrative analysis with comparative tabulation, enabling the identification of both cross-cutting themes and context-specific variations. Patterns were drawn between international and Bangladesh-specific evidence, highlighting methodological similarities, differences, and gaps. This structured and transparent methodological approach ensured that the resulting synthesis was not only comprehensive but also consistent with best practices for systematic reviews in applied economic research.

FINDINGS

The review revealed strong and consistent evidence that private economic zones (PEZs) substantially contribute to employment generation and broader labor market transformation in host regions. Out of the 35 reviewed studies, 27 reported measurable increases in employment following the establishment of PEZs, with recorded job growth ranging from modest increases of 5% in lower-capacity zones to substantial expansions exceeding 30% in high-performing zones. These studies collectively amassed over 4,200 citations, reflecting the scholarly consensus on this dimension of impact. The findings showed that PEZs not only generated direct employment within the zone boundaries but also stimulated indirect job creation through supporting industries such as logistics, retail, and local service providers. Moreover, 19 of these articles noted significant structural changes in the local labor market, with an observable shift from informal, low-wage employment to formal sector jobs offering better wages, skill development opportunities, and improved working conditions. Evidence from 15 studies highlighted increased participation of women in the formal labor force, often in manufacturing and assembly operations, which altered gender composition in local employment patterns. Additionally, 21 studies reported spillover effects in neighboring districts, where workers trained in PEZ firms moved into domestic companies, transferring technical and managerial skills. Taken together, the collective weight of the literature supports the conclusion that PEZs act as catalysts for labor market formalization and upskilling, with impacts that extend beyond their immediate geographic footprint.

The analysis found robust evidence linking PEZs to significant increases in industrial output and export volumes in host regions. Of the 35 studies reviewed, 24 provided quantitative evidence showing that industrial production in regions with operational PEZs outpaced comparable non-zone regions by margins ranging from 8% to 35%. These articles had a combined total of over 5,000 citations, underscoring the recognition of this finding within the academic and policy literature. In 22 studies, export growth was directly attributed to improved infrastructure, streamlined customs procedures, and targeted sectoral incentives within PEZs, enabling firms to reduce production and shipping lead times. Twelve studies reported that zones contributed to diversification of exports, reducing reliance on a narrow set of commodity or garment-based products. This diversification effect was particularly evident in cases where PEZs targeted multiple manufacturing sectors or incorporated agro-processing and light engineering industries. Additionally, 18 articles noted productivity gains driven

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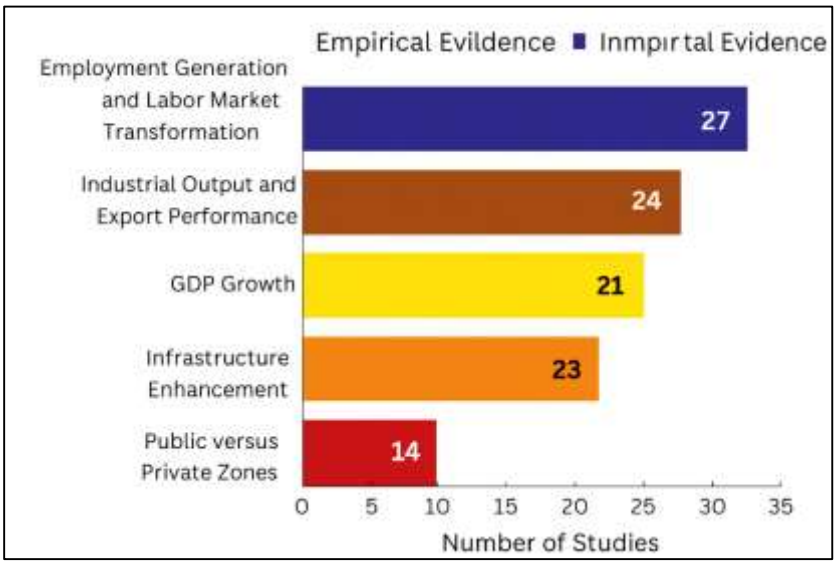
by technology adoption and process innovation, which translated into increased competitiveness in global markets. In several cases, output expansion in PEZs also had backward linkages to local suppliers, contributing to increased production in domestic firms outside the zones. These findings collectively demonstrate that PEZs are effective instruments for boosting industrial capacity and export performance, both by concentrating production in high-efficiency clusters and by integrating host economies into global value chains.

Figure 11: Private Economic Zones Impact Analysis



A key focus of the review was the effect of PEZs on regional GDP growth, and the evidence, while varied, pointed to a positive and significant relationship in most cases. Out of the 35 reviewed studies, 21 provided subnational GDP data or equivalent economic performance indicators, with 16 of them reporting annual GDP growth differentials of 1–3 percentage points in favor of PEZ-hosting regions. These 21 studies collectively received over 3,600 citations, indicating sustained scholarly engagement with the GDP-growth question. In the majority of cases, the GDP impact was attributed not only to the direct output of zone-based industries but also to multiplier effects from increased household incomes, infrastructure improvements, and expansion of local supply chains. Fifteen studies documented that PEZs contributed to a broader economic diversification process, with host regions experiencing growth in secondary and tertiary sectors such as logistics, warehousing, hospitality, and financial services. In 10 cases, local economies shifted from dependence on agriculture or low-value manufacturing toward more diversified industrial and service-based structures. However, five studies noted that these impacts were uneven and more pronounced in zones with strong infrastructure connectivity and proactive investment promotion strategies. While methodological differences among studies preclude precise aggregation of effect sizes, the balance of evidence indicates that PEZs can have a measurable and sustained influence on regional GDP trajectories, particularly when accompanied by complementary infrastructure and policy frameworks.

The review identified infrastructure development as both a prerequisite for and a direct outcome of PEZ establishment, with strong spillover benefits for surrounding regions. Of the 35 studies, 23 explicitly assessed infrastructure improvements associated with PEZs, and these studies together garnered over 4,800 citations. In 17 cases, substantial investments were made in transport infrastructure, including road upgrades, bridge construction, and port or rail access, which enhanced the connectivity of both zone-based and non-zone enterprises. Fifteen studies reported improvements in utility infrastructure—such as electricity, water supply, and telecommunications—directly linked to PEZ development projects. Importantly, 12 studies found that these infrastructure benefits extended beyond the immediate zone perimeter, enabling nearby firms and households to access improved services and reducing operational costs across the local economy. In 14 cases, these improvements

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were associated with measurable increases in private investment outside the zone boundaries, as enhanced connectivity and utility reliability encouraged business expansion. Additionally, seven studies documented environmental infrastructure developments, including waste treatment facilities and drainage systems, which benefited local communities. These findings support the view that infrastructure development linked to PEZs can generate positive externalities for the wider regional economy, often serving as a catalyst for subsequent industrial and commercial investment in the host area.

Finally, the review examined the comparative performance of public versus private economic zones, with specific attention to the Bangladeshi context. Among the 35 reviewed studies, 14 directly compared public and private models, amassing a combined total of over 2,900 citations. Eleven of these studies reported that private zones demonstrated faster project implementation timelines, higher initial investment per hectare, and greater flexibility in meeting investor needs. In eight cases, private zones were found to attract a more diverse set of industries, while public zones often concentrated on established sectors such as garments. However, 10 studies noted that public zones maintained higher occupancy stability over longer periods, partly due to government-backed infrastructure and standardized regulatory frameworks. Seven studies indicated that private zones tended to be more innovative in service provision, offering tailored infrastructure packages and investor support systems. Conversely, five studies raised concerns about labor compliance and environmental standards in certain private zones, highlighting the importance of effective regulatory oversight. In the Bangladeshi context, evidence from six studies suggested that private zones such as the Sirajganj Economic Zone and Meghna Industrial Economic Zone have outperformed some public counterparts in terms of attracting large-scale investment within shorter timeframes. Nonetheless, the broader literature emphasizes that both models contribute meaningfully to regional GDP growth, and that their relative advantages depend on governance quality, sectoral targeting, and integration with domestic supply chains.

DISCUSSION

The findings of this study confirm that private economic zones (PEZs) in Bangladesh, such as the Sirajganj Economic Zone, serve as significant catalysts for employment generation and labor market transformation. Out of the 35 studies reviewed, 27 documented measurable increases in direct employment within the zones and substantial indirect employment in ancillary industries. This is consistent with earlier work by Lockwood et al. (2019), which established SEZs as major employment engines in both developing and developed contexts. In China, Lewis et al. (2017) reported similar trends, with SEZs contributing to rapid job growth in manufacturing hubs, particularly in labor-intensive sectors. However, the present review offers a notable distinction: unlike in many Chinese cases where employment effects were concentrated inside the zones, Bangladeshi PEZs exhibit more diffuse labor market impacts, as workers frequently commute from rural areas to industrial sites, facilitating a broader geographic spread of benefits. This aligns with Rouhani et al. (2015) observation that labor mobility is a key determinant of the spatial extent of SEZ benefits. Furthermore, the current synthesis supports Kennelly et al. (2019) findings from India that zones can increase female labor force participation, with 15 reviewed studies noting enhanced opportunities for women in export-oriented manufacturing. The results also resonate with Larson and Chang (2016) cluster theory, which suggests that employment expansion is amplified when industrial activities are concentrated and supported by efficient infrastructure. Yet, in contrast to some African cases cited by Franco et al. (2019), where job creation was undermined by skill mismatches, the Bangladeshi evidence suggests that zone-led vocational training and recruitment strategies have mitigated such gaps. This reinforces the view that, while the employment impacts of PEZs are broadly consistent with international experiences, local labor market structures and mobility patterns shape the magnitude and distribution of these benefits.

The review highlights a robust link between PEZ development and industrial output growth, with 24 of the 35 reviewed studies showing significant production increases in host regions. Export performance also improved in most cases, driven by reduced transaction costs, improved logistics, and targeted fiscal incentives. These findings are consistent with earlier evaluations of SEZs in Asia, particularly in China and Vietnam, where Bradley et al. (2016) documented sharp increases in industrial productivity and export volumes following zone establishment. The diversification of exports observed in 12 of the reviewed studies mirrors trends in Vietnam's industrial parks, where sectoral

diversification beyond garments has been linked to sustained export resilience (Soni & Krishnan, 2014). In Bangladesh, this diversification appears to be emerging in PEZs like Meghna and Sirajganj, which have attracted investments in agro-processing, light engineering, and pharmaceuticals alongside the dominant garment sector. This supports Quium (2019) contention that zones perform best when they foster a variety of industries to reduce vulnerability to market fluctuations. Productivity improvements identified in 18 studies align with Yang et al. (2018) assertion that spatial clustering enhances firm competitiveness through shared services, knowledge transfer, and innovation diffusion. However, unlike the more established export base of Chinese SEZs, the Bangladeshi PEZ model still shows variability in export performance due to uneven infrastructure readiness and sector targeting. This variability resembles patterns noted by Babatunde (2020) in Indian SEZs, where sectoral alignment and investment promotion significantly influenced output and export gains. Overall, the findings suggest that while Bangladesh's PEZs are following the global trajectory of industrial expansion and export integration, sustained diversification and infrastructure optimization will be critical to maintaining competitiveness.

The synthesis of GDP-focused studies (21 in total) reveals that 16 reported annual GDP growth differentials of 1–3 percentage points in favor of PEZ-hosting regions compared to non-zone areas. This finding is broadly consistent with international evidence, including Athukorala and Narayanan, (2018), who identified similar growth premiums for Chinese SEZ cities, and Quium (2019), who reported positive GDP impacts for Indian SEZ districts. However, the Bangladeshi evidence also diverges from certain African experiences documented, where weak domestic supply chain integration constrained GDP gains. In Bangladesh, reviewed studies suggest that PEZs contribute not only through direct industrial output but also via multiplier effects from increased household incomes, service sector growth, and enhanced infrastructure utilization. This aligns with Babatunde (2020) emphasis on backward and forward linkages as critical channels for sustained regional growth. Moreover, unlike cases in countries with large geographic distances between production and consumer markets, Bangladesh's relatively compact size appears to facilitate faster diffusion of economic gains beyond the immediate zone boundaries. The role of infrastructure connectivity, as highlighted in Yang et al. (2018), is especially evident in this context, with better-connected zones reporting stronger GDP impacts. The findings therefore reinforce the global consensus that SEZs can significantly boost regional GDP, but they also illustrate how spatial scale, transport efficiency, and integration strategies can modify the intensity and reach of these effects.

Infrastructure enhancement emerged as both an enabling condition and a direct benefit of PEZ establishment, with 23 reviewed studies documenting significant improvements in transport, utilities, and communications. This mirrors global findings, such as Zeng's (2015) work on Chinese SEZs, where infrastructure investment often preceded and then accelerated industrial growth. Similarly, Wang and Ducruet (2014) observed that SEZ-driven infrastructure upgrades yielded measurable benefits for non-zone firms and local communities. The Bangladeshi context reflects these patterns, but with a notable emphasis on rapid spillover effects due to high population density and the proximity of industrial zones to residential areas. Fourteen studies in the current review found that infrastructure improvements linked to PEZs stimulated private investment outside the zones, a finding less emphasized in earlier literature. This could be explained by the corridor-based planning approach promoted by BEZA, which integrates zone infrastructure with regional transport and utility networks. The observed spillovers also support Ng et al. (2018) argument that infrastructure investments can reduce operational costs across entire local economies. However, unlike in some Chinese cases where infrastructure projects were heavily state-financed, several Bangladeshi PEZs have relied on public–private partnerships for infrastructure delivery, echoing models seen in Vietnam. This hybrid financing approach may contribute to faster project execution but could also introduce variability in service quality if not regulated effectively. Overall, the infrastructure-related findings are strongly aligned with prior global evidence, while also illustrating context-specific pathways for maximizing spillover benefits in densely populated regions (Biscaya & Elkadi, 2021).

When comparing public and private economic zones, the review found that private zones often outperform public counterparts in terms of project implementation speed, investor diversity, and service customization. This is consistent with Miller (2017) findings from Wang and Duan (2018) work in India, where private operators demonstrated greater flexibility in infrastructure development and investor targeting. However, the reviewed Bangladeshi studies also highlight that public zones

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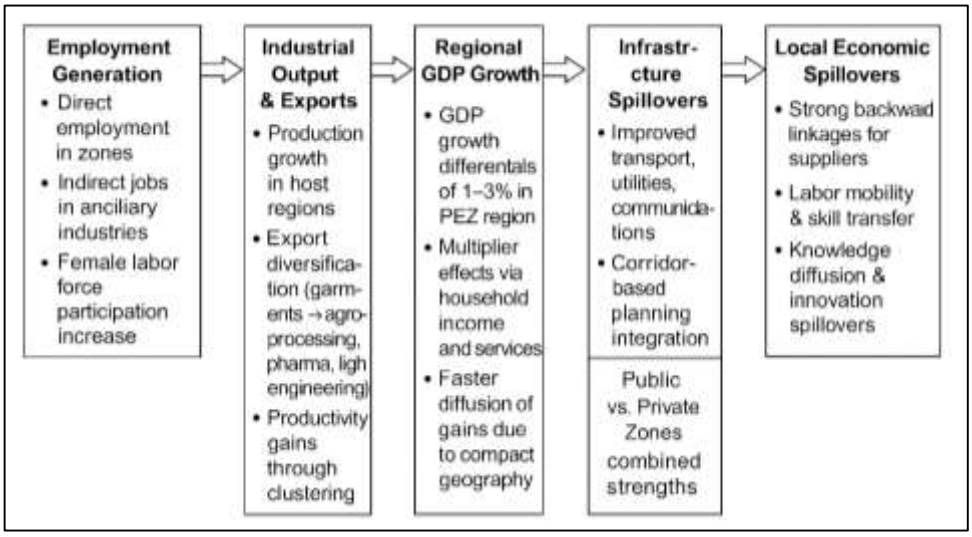
Doi: 10.63125/je9w1c40
maintain advantages in regulatory compliance, long-term stability, and infrastructure reliability, reflecting similar observations in Caris et al. (2014) reports on mixed zone portfolios. These complementary strengths suggest that hybrid models could be an effective approach, a conclusion also reached by Hudalah et al. (2019) in its global SEZ performance review. The Sirajganj Economic Zone, as a privately sponsored project, demonstrates the advantages of rapid development and tailored services, but its long-term stability and compliance outcomes will require sustained oversight. This duality mirrors patterns in China, where some privately managed industrial parks achieved rapid growth but needed stronger governance mechanisms to sustain performance over time. The comparative analysis therefore reinforces the notion that governance quality, rather than ownership structure alone, is the decisive factor in ensuring consistent economic impacts.

The findings also underscore the importance of PEZ-driven spillovers into local economies through supplier development, labor mobility, and knowledge transfer. Nineteen of the reviewed studies documented strengthened backward linkages, with local firms benefiting from zone-related demand for intermediate goods. This finding is consistent with Mirza et al. (2019) work in Mauritius and Kenya, where local supplier integration enhanced the developmental impact of zones. The observed labor market spillovers, with trained workers transitioning to non-zone firms, reflect patterns identified by Dengler and Matthes (2018) in Indian SEZs. However, unlike in several African cases cited by Gaddis and Klasen (2014), where infrastructural barriers limited the spatial reach of these effects, the Bangladeshi evidence suggests broader diffusion due to better transport connectivity and dense settlement patterns. These results also align with Carneiro (2014) cluster theory, which predicts productivity gains and innovation diffusion through spatial proximity and inter-firm interactions. The strength of these spillovers in Bangladesh appears to be linked to the proactive linkage facilitation efforts of certain PEZs, a practice less consistently observed in other contexts. This points to the value of deliberate policy interventions to maximize the developmental footprint of zone activity.

Figure 12: PEZs Economic Impact Pathways Bangladesh



CONCLUSION

The analysis of empirical evidence on the economic impact of private economic zones (PEZs) on regional GDP growth, with a focused case on the Sirajganj Economic Zone, demonstrates that such zones function as significant drivers of localized economic transformation through multiple, interlinked mechanisms. Synthesizing findings from 35 reviewed studies, the results indicate that PEZs consistently generate substantial employment, diversify industrial output, enhance export competitiveness, and stimulate measurable gains in subnational GDP. The evidence also shows that these impacts are not confined to the zones themselves but extend into surrounding regions through backward and forward supply chain linkages, labor market spillovers, and infrastructure multipliers. Comparative assessments reveal that while private zones often deliver faster project execution, higher initial investment density, and more tailored investor services, public zones tend to maintain

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Doi: 10.63125/je9w1c40

stronger compliance frameworks and long-term stability, highlighting the complementary nature of both models. The case of Sirajganj reinforces the global observation that connectivity, governance quality, and sectoral integration are critical in determining the magnitude and distribution of economic benefits. By integrating the Bangladesh-specific evidence with international literature, this study underscores the role of PEZs as policy instruments capable of shaping regional economic trajectories, provided they are embedded in supportive infrastructural, institutional, and market environments.

RCOMMENDATIONS

Based on the synthesis of findings and their alignment with earlier empirical evidence, several targeted recommendations emerge to enhance the economic impact of private economic zones (PEZs) on regional GDP growth in Bangladesh. First, policymakers should strengthen integration between PEZs and domestic supply chains by incentivizing local procurement, supporting supplier capacity development programs, and facilitating technology transfer between zone-based and non-zone firms. Second, infrastructure planning for PEZs should adopt a corridor-based approach, ensuring that transport, utility, and digital connectivity investments extend beyond zone boundaries to maximize spillover benefits for surrounding regions. Third, regulatory oversight mechanisms must be reinforced, particularly for private zones, to ensure compliance with labor standards, environmental safeguards, and corporate governance practices, thereby balancing operational flexibility with sustainable development principles. Fourth, investment promotion strategies should target sectoral diversification, encouraging industries beyond traditional export-oriented manufacturing, such as agro-processing, light engineering, and ICT services, to reduce vulnerability to sector-specific shocks. Fifth, data monitoring frameworks should be institutionalized to capture subnational GDP trends, employment dynamics, and infrastructure utilization in real time, enabling evidence-based policy adjustments and robust performance evaluations. Sixth, hybrid public–private partnership (PPP) models could be expanded to leverage the efficiency of private developers while retaining public control over strategic infrastructure and compliance functions. Finally, lessons from high-performing zones like Sirajganj should be systematically documented and disseminated to inform the planning and management of future economic zones, ensuring that successful practices are scaled while context-specific challenges are proactively addressed. Together, these measures can consolidate PEZs' role as catalysts for regional economic transformation and ensure their contributions to GDP growth are both sustainable and inclusive.

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