

The Role of Internal Auditing in Enhancing the Attractiveness and Competitiveness of Special Economic Zones: An International Comparative Study and Implications for Investment Strategies.

Le rôle de l'audit interne dans le renforcement de l'attractivité et de la compétitivité des zones économiques spéciales : une étude comparative internationale et implications pour les stratégies d'investissement.

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Abstract

This study analyzes the role of internal audit in enhancing the attractiveness and competitiveness of Special Economic Zones (SEZs) through a comparative assessment of Morocco, Singapore, Ethiopia, India, and Brazil. Beyond fiscal incentives and infrastructure, the findings emphasize the decisive importance of governance, transparency, and institutional credibility supported by effective internal audit mechanisms. Using an ARDL framework for the period 2016–2024, the results confirm that internal audit strengthens investor confidence by reducing information asymmetry and ensuring compliance with global standards such as OECD Pillar Two. Exports and employment emerge as primary economic drivers, while tax incentives prove effective only when embedded in credible governance systems. Policy recommendations call for moving beyond narrow fiscal paradigms toward integrated governance and compliance strategies to secure SEZs' long-term competitiveness.

Keywords: Internal Audit; Special Economic Zones; Attractiveness and Competitiveness; Tax Incentives; Foreign Direct Investment.

Résumé

Cette étude analyse le rôle de l'audit interne dans le renforcement de l'attractivité et de la compétitivité des zones économiques spéciales (ZES), à travers une comparaison internationale entre le Maroc, Singapour, l'Éthiopie, l'Inde et le Brésil. Au-delà des incitations fiscales et des infrastructures, les résultats soulignent l'importance décisive de la gouvernance, de la transparence et de la crédibilité institutionnelle, soutenues par des mécanismes d'audit interne efficaces. À l'aide d'un modèle ARDL couvrant la période 2016–2024, l'analyse confirme que l'audit interne renforce la confiance des investisseurs en réduisant l'asymétrie d'information et en assurant la conformité avec les standards internationaux tels que le Pilier Deux de l'OCDE. Les exportations et l'emploi apparaissent comme les principaux moteurs économiques, tandis que les incitations fiscales ne sont réellement efficaces que lorsqu'elles s'inscrivent dans des cadres de gouvernance crédibles. Les recommandations appellent à dépasser une approche strictement fiscale pour privilégier des stratégies intégrées de gouvernance et de conformité, garantes de la compétitivité durable des ZES.

Mots-clés : Audit interne ; Zones économiques spéciales ; Attractivité et compétitivité ; Incitations fiscales ; Investissement direct étranger (IDE).

Introduction

Over the past decade, SEZs have become central tools of territorial competition, enabling countries to attract investment, integrate into global value chains, and accelerate industrialization. By 2019, UNCTAD counted 5,400 SEZs in 145 economies, a number still rising in 2024, as global FDI reached USD 1,485 billion. Competition now hinges increasingly on sustainability: 90% of SEZs have sustainability focal points and 76% provide clean energy infrastructure. At the same time, the global minimum tax is reshaping incentive regimes, elevating governance and internal control as critical to investment credibility.

Country experiences illustrate divergent models. Morocco's Tanger Med hub hosts 1,200 firms, 110,000 jobs, and USD 15 billion in exports ($\approx 20\%$ of national total). Singapore secured SGD 13.5 billion in 2024 investments with nearly 19,000 expected jobs, confirming its stability as a regulatory enclave. India operates about 280 SEZs, exporting USD 163.69 billion in 2023–24, mainly in services and electronics. Ethiopia's parks face macroeconomic challenges yet have created over 100,000 jobs. Brazil's Manaus Zone recorded BRL 204 billion turnover in 2024 and 130,000 jobs, reflecting its enduring domestic-oriented model.

In this context, internal audit emerges as a strategic lever: it underpins the credibility of incentives and compliance frameworks, validates performance and ESG metrics, and reduces investor information gaps. The 2024 Global Internal Audit Standards reinforce independence, governance, and assurance mapping, aligning SEZs with rising demands for transparency and sustainability. With 58% of zones publishing sustainability reports, robust risk-based audits covering taxation, environmental controls, procurement, and customs are essential for SEZs to transition toward higher value-added, technology-intensive investment strategies across the studied cases.

Despite their growing role in structuring foreign direct investment flows and integrating into global value chains, special economic zones (SEZs) display significant heterogeneity in terms of attractiveness, performance, and sustainability. This disparity cannot be explained solely by tax incentives, infrastructure quality, or geographic location; it also reflects the strength of governance mechanisms, the transparency of operations, and the ability of institutions to credibly monitor and evaluate performance. In this context, internal audit still underexplored in SEZ-related research may constitute a strategic lever for aligning public objectives, operator practices, and the expectations of international investors. This leads to the central question: **to what extent, and through what mechanisms, does internal audit contribute to strengthening the attractiveness and competitiveness of special economic zones, and to steering investment strategies toward higher value-added segments in distinct national contexts such as**

Morocco, Singapore, Ethiopia, India, and Brazil?

To address this question, several sub-questions arise. First, what internal audit systems and practices are currently implemented in the SEZs of the countries studied, and to what extent do they comply with international standards (IIA, 2024)? Second, how do these systems influence risk perception, investor confidence, and measurable performance in terms of employment, exports, and integration into value chains? Third, what comparative lessons can be drawn from the differentiated trajectories of countries with contrasting regulatory maturity and infrastructure development? what adaptations or innovations in the internal audit function could reconcile the imperatives of competitiveness, regulatory compliance, and sustainability in competitive environments subject to rapid change (international tax reform, energy transition, ESG requirements)?

Our research is structured around a scientific approach designed to analyze the role of internal audit in strengthening the attractiveness and competitiveness of Special Economic Zones (SEZs). It begins with an introduction that outlines the context and research problem, followed by the objectives and hypotheses, focused on institutional credibility, the interaction between tax incentives and governance, and the economic spillovers of SEZs. The literature review, organized into five axes, examines the foundations of SEZ performance, the role of internal audit in governance, the effects of zone design and spillovers, sustainability reporting, and issues of taxation and compliance. The methodology applies an ARDL model to five countries (Morocco, Singapore, Ethiopia, India, Brazil) over the period 2016–2024, complemented by unit root and cointegration tests. The empirical analysis presents both short- and long-term results that validate the hypotheses, while the conclusion provides strategic recommendations on governance, internal audit, and sustainability as levers for reinforcing SEZ competitiveness.

The primary objective of this research is to determine the effective role of internal audit in strengthening the attractiveness and competitiveness of special economic zones (SEZs), by examining both its technical dimensions (methodologies, compliance with standards, control mechanisms) and its strategic dimensions (impact on investor perception, credibility of incentives, governance). More specifically, the aims are to: (1) conduct a comparative analysis of internal audit systems implemented in the SEZs of five countries representative of contrasting regulatory and economic contexts (Morocco, Singapore, Ethiopia, India, Brazil); (2) assess the impact of these systems on measurable performance indicators volume and quality of investment, job creation, exports, integration into global value chains, and ESG compliance; and (3) identify best practices and innovations to optimize the internal audit function in a global environment shaped by international tax reform, the energy transition, and the growing importance of

sustainability criteria.

Three hypotheses guide this investigation. The first states that the effectiveness of internal audit, as a governance and control mechanism, has a significant and positive effect on SEZ performance by reducing information asymmetry and strengthening investor confidence. The second posits that the combination of tax incentives and credible institutional governance is a necessary condition for transforming fiscal advantages into sustainable attractiveness, particularly within the framework of new international tax rules (OECD, Pillar Two). The third hypothesis asserts that the economic spillovers of SEZs particularly in terms of FDI, exports, and employment are directly dependent on the quality of institutions and control mechanisms, and that robust governance maximizes these positive externalities.

This study uses a quantitative approach based on the Auto-Regressive Distributed Lag (ARDL) model to assess the link between internal audit quality and the economic performance of special economic zones (SEZs) in Morocco, Singapore, Ethiopia, India, and Brazil (2016–2024). The ARDL model is chosen for its capacity to handle mixed integration orders $[I(0), I(1)]$, capture short- and long-term effects, and provide reliable estimates with small samples. Data come from international (UNCTAD, World Bank, IMF, OECD) and national sources, complemented by qualitative indicators of audit systems (IIA standards, audit frequency, report disclosure, ESG integration). The analysis follows three steps: (1) stationarity testing (ADF, PP); (2) ARDL estimation and co-integration analysis via Pesaran bounds testing; and (3) interpretation of short- vs. long-term effects, emphasizing how internal audit strengthens SEZ attractiveness and competitiveness.

1. Literature Review

Research on SEZs has shifted from emphasizing fiscal and infrastructural benefits to a broader view where governance, transparency, and internal audit are central to competitiveness. Empirical and theoretical works (Farole, 2011; Zeng, 2015; Globerman & Shapiro, 2002) show that SEZ effectiveness relies as much on institutional quality and credible management as on incentives. Internal audit thus plays a key role by reducing information asymmetry, ensuring compliance, and building investor confidence, complementing fiscal and trade policies. The review is organized into five axes: (1) SEZ performance and governance foundations, (2) internal audit, governance, and investment attractiveness, (3) SEZ design, economic results, and spillovers, (4) audit in sustainability and ESG assurance, and (5) tax incentives, international taxation, and compliance infrastructure. This framework underlines how internal audit strengthens sustainable competitive advantages amid fiscal competition and evolving global standards.

1.1. Foundations: SEZ Performance and Governance, Control.

Foundational works demonstrate that the effectiveness of Special Economic Zones (SEZs) does not derive solely from fiscal incentives but rather from a systemic set of factors combining infrastructure, regulatory predictability, and local integration. In a structured comparison, Farole, T. (2011), highlights that the success of African SEZs depends more on logistics, regulatory frameworks, and local linkages than on the generosity of fiscal advantages. From a global Sino-African perspective, Zeng, D. Z. (2015), underscores the importance of long-term public commitment, strategic planning, and execution capacity, while warning of the proliferation of underperforming parks in contexts of weak governance. Using Chinese data, Wang, J. (2013), demonstrates that SEZs can enhance FDI inflows and total factor productivity, though the magnitude of these effects depends critically on timing and institutional design. Moberg, L. (2017), complements this perspective by showing that the incentives of governments, developers, and firms require credible governance and control architectures to avoid rent-seeking and inefficient allocation.

Beyond average outcomes, the literature on internal governance highlights the role of internal audit in strengthening control systems. Through qualitative analysis, Sarens, G., & De Beelde, I. (2006, IJA), show that audit independence, expectation clarity, and coordination with management shape an organization's ability to manage risk and ensure accountability. In a U.S./Belgium comparison, Sarens, G., & De Beelde, I. (2006, MAJ), emphasize that the formal integration of internal audit into risk management frameworks enhances the credibility of information and compliance critical levers of attractiveness for ecosystems such as SEZs. These findings suggest that SEZ authorities and operators must incorporate audit functions with clear mandates, sufficient resources, and independent reporting lines into their governance systems.

A sub-literature on internal audit effectiveness clarifies the channels through which audit quality strengthens the credibility of reported indicators, a necessary condition for attracting « sophisticated » investment. Arena, M., & Azzone, G. (2009), identify three determinants of audit effectiveness team characteristics, processes/activities, and organizational alignment offering an operational framework that can be applied to SEZ authorities. Prawitt, D. F., et al (2009), show that internal audit quality is associated with reduced earnings management, thereby reinforcing investor confidence a finding that can be transposed to SEZ metrics such as FDI, jobs, and exports. Sarens, G., & De Beelde, I. (2009), demonstrate that internal audit serves as a « comfort provider » to the audit committee, enhancing alignment between governance, control, and strategy an essential condition for converting fiscal and infrastructural advantages into sustainable competitive gains.

1.2. Internal Audit, Governance Mechanisms, and Investment Attractiveness

Recent literature highlights that the effectiveness of internal audit (IA) is primarily determined by its organizational design and integration within governance mechanisms. Arena, M., & Azzone, G. (2009), demonstrate that team competence, process rigor, and the hierarchical positioning of the audit function are key determinants of its effectiveness. Similarly, Alzeban, A., & Gwilliam, D. (2014), using a large sample from the Saudi public sector, confirm that auditor competence, management support, organizational independence, and the quality of interactions with the audit committee are essential for strengthening IA credibility and perceived effectiveness. These findings are consistent with Sarens, G., & De Beelde, I. (2006), who show that IA can compensate for control losses in complex organizations by enhancing transparency and fostering stakeholder trust.

Studies focusing on financial markets underscore that IA quality has tangible effects on financial reporting and investor confidence. Prawitt, D. F., et al (2009), establish that high-quality internal audit functions are associated with reduced earnings management (e.g., abnormal accruals), thereby lowering information risk and fostering more efficient capital allocation. Barua, A., et al (2010), find that independent and experienced audit committees tend to invest more in IA, while Abbott, L. J., et al (2004), link stronger audit committees to fewer financial restatements, illustrating the complementarity between board-level governance and internal assurance. In this sense, IA serves as a mechanism that enhances the ex-ante credibility of SEZs by reducing uncertainty regarding execution and the reliability of economic indicators.

At the institutional level, a territory's attractiveness to foreign direct investment (FDI) is strongly correlated with governance quality. Globerman, S., & Shapiro, D. (2002), show that institutional infrastructure significantly influences both inward and outward FDI flows, while Daude, C., & Stein, E. (2007), demonstrate that property rights protection and reduced expropriation risk substantially increase FDI inflows. In this context, micro-governance mechanisms such as a robust and independent IA act as operational relays, translating institutional quality into credible signals for investors and ecosystems like SEZs. Christopher, J., et al (2009), highlight that threats to IA independence (e.g., managerial pressure, budgetary constraints), necessitate strong institutional safeguards to preserve its legitimacy and ensure its role as a guarantor of transparency.

1.3. SEZ Design, Economic Performance, and Spillover Effects

Early contributions emphasize that the design of Special Economic Zones (SEZs) directly determines their economic performance. Madani, D. (1999), stresses that SEZs should not be

reduced to simple export enclaves but rather conceived as catalysts for industrial and technological integration. Farole, T., & Akinci, G. (2011), confirm this perspective, highlighting that successful SEZs combine modern infrastructure, regulatory clarity, and mechanisms for local integration. More recently, Wang, J. (2013), through an empirical analysis of Chinese municipalities, demonstrates that the success of an SEZ rests on strong institutional planning capable of coordinating foreign investment with domestic industrial development.

The literature also underscores the importance of spillover effects, which represent a crucial dimension of SEZ impact. Ge, W. (1999), shows that Chinese SEZs generated significant technological externalities benefiting local firms, thereby improving productivity. Along similar lines, Akinci, G., & Crittle, J. (2008), highlight that spillover effects depend on SEZs' ability to connect local value chains to global flows. Alder, M., et al (2016), go further by demonstrating that SEZs can drive structural transformation at the national level, but only if supported by strong institutions and credible governance. These findings suggest that SEZs can fully realize their potential only when they transcend the logic of enclaves and integrate into the broader national economy.

Several studies remind us that institutional constraints can significantly limit SEZ outcomes. Moberg, L. (2017), argues that in weak institutional contexts, SEZs may foster rent-seeking rather than innovation. Zeng, D. Z. (2015), from a Sino-African perspective, warns against the proliferation of underperforming parks in the absence of governance and strategic oversight. The FIAS. (2008), stresses the importance of regulatory frameworks and administrative efficiency in determining the attractiveness of SEZs. Collectively, these contributions confirm that SEZ design, institutional anchoring, and the capacity to generate spillovers constitute the three decisive levers for their performance and long-term sustainability.

1.4. Sustainability Reporting, Assurance, and the Role of Internal Audit

The literature on sustainability reporting emphasizes that the credibility of environmental, social, and governance (ESG), information strongly depends on external assurance mechanisms and governance structures. Simnett, R., et al (2009), in a large international study, show that firms voluntarily choose to obtain assurance on their sustainability reports, and that the type of provider (audit firms vs. consultants) depends on institutional and industry characteristics. Peters, G. F., & Romi, A. M. (2015), highlight that the presence of an environmental committee on the board and the appointment of a Chief Sustainability Officer increase the likelihood of assurance engagement. In the U.S. context, Casey, R. J., & Grenier, J. H. (2015), describe the « CSR assurance paradox », showing that despite the perceived value of assurance, adoption remains

limited due to cost considerations and strategic trade-offs. Kolk, A., & Perego, P. (2010), demonstrate that stakeholder orientation and the strength of rule enforcement at the country level shape both the adoption of assurance and the choice of provider, confirming the institutional embeddedness of ESG credibility.

Beyond assurance, the intrinsic quality of ESG reporting remains heterogeneous and exposed to greenwashing risks. Boiral, O. (2013), demonstrates that some GRI-compliant reports function as simulacra, masking real tensions between economic performance and environmental impact. By contrast, Eccles, R. G., et al (2014), find that « high sustainability », firms adopt distinctive governance processes (board oversight, executive incentives) and achieve better long-term accounting and stock market performance. More recently, Christensen, H. B., et al (2021), synthesize the economic effects of mandatory reporting, outlining both costs and benefits, as well as the conditions under which ESG information is valued by markets and stakeholders. These contributions reinforce the argument that alignment between external assurance and governance quality is decisive in ensuring the credibility and decision-usefulness of sustainability reports. market reactions to disclosure mandates confirm the importance of a robust control infrastructure, including internal audit. Grewal, J., et al (2019), observe differentiated stock market responses to the adoption stages of the EU Non-Financial Reporting Directive, consistent with expectations of compliance costs and selection effects. In China, Chen, Y.-C., et al (2018), find that mandatory CSR disclosure reduces profitability but generates positive environmental externalities and investment efficiency gains. In this context, internal audit emerges as a key actor in the ESG reporting value chain, by developing materiality-based audit plans, ensuring indicator traceability, and coordinating with external auditors. Thus, internal audit transforms regulatory obligations (CSRD/GRI) into verifiable and decision-useful information for investors and SEZ authorities, strengthening both credibility and competitiveness.

1.5. Tax Incentives, International Taxation (Pillar Two), Trade Facilitation, and Compliance Infrastructure

The literature on investment taxation shows that tax incentives only generate lasting effects on foreign direct investment (FDI) when embedded in a credible and predictable framework. The EATR/EMTR metrics, Devereux, M. P., & Griffith, R. (2003), shed light on how multinationals arbitrate location decisions beyond statutory rates, while the « multi-tax », approach of Desai, M. A., (2004), reminds us that VAT, duties, and other indirect taxes also shape capital labor structures and site selection. Using multi-country evidence, Klemm, A., & Van Parys, S. (2012), confirm the widespread use of tax incentives in a context of fiscal competition but find that their attraction effect varies significantly once institutional quality is controlled for. These studies

converge on a key insight: tax incentives in SEZs are effective only when complemented by strong governance and compliance infrastructures.

The international environment reinforces this demand for credibility. The OECD Globe rules (Pillar Two) introduce a 15% global minimum tax through top-up mechanisms when jurisdictional effective tax rates fall below the threshold, thereby eroding the benefits of many preferential regimes (e.g., exemptions, holidays). This compels governments to recalibrate incentives toward « qualifying », schemes (linked to expenditures, assets, jobs) and non-tax advantages such as infrastructure, skills, and governance (OECD, 2021; 2022). In this context, compliance capacity and enforcement credibility become first-order determinants of effectiveness. Slemrod, J. (2019), emphasizes that compliance and the reduction of information asymmetry critically shape corporate responses to fiscal incentives. Thus, beyond design, the credibility of delivery becomes decisive in an era of global tax coordination.

At the level of global value chains, trade facilitation produces measurable effects: each additional day of delay before shipment reduces trade by more than 1%, highlighting the value of « hard », infrastructure (logistics, customs) and « soft » infrastructure (procedures, ICT) for export-oriented SEZs, Djankov, S., et al, (2010), Portugal-Perez, A., & Wilson, J. S., (2012). Institutional complements also condition spillovers. Busse, M., & Groizard, J. (2008), show that regulatory quality amplifies the growth impact of FDI, while Zagler, M. (2023), demonstrates that legal uncertainty around corporate income tax discourages FDI, including through interactions with treaties and corruption. For SEZ authorities and investors, the operational takeaway is clear: a robust compliance and control infrastructure (internal audit, fiscal and customs assurance mapping, compliance analytics), becomes a strategic competitive asset, ensuring that the promises of attractiveness are both observable and verifiable in a global context of tax floors and time-sensitive supply chains.

The literature highlights that the effectiveness of SEZs relies on a multidimensional framework combining economic performance, governance, internal audit, taxation, sustainability, and compliance. Their success depends not only on infrastructure but also on governance and control mechanisms ensuring transparency and limiting inefficiencies. Internal audit emerges as a key credibility driver in risk management and ESG reporting by reducing information asymmetry and enhancing investor confidence. Moreover, tax incentives are effective only within stable institutional environments aligned with OECD Pillar Two, while trade facilitation and logistics directly influence SEZ competitiveness. Overall, integrating internal audit, governance, and compliance infrastructures forms a decisive lever to align SEZ attractiveness, competitiveness, and sustainability, and provides a robust empirical basis for the econometric analysis.

2. Empirical Analysis

2.1. Descriptive analysis

Descriptive analysis is essential to situate the role of internal audit in SEZ performance and attractiveness. It provides a comparative overview of five countries (Morocco, Singapore, Ethiopia, India, and Brazil) between 2016–2024, focusing on FDI, exports, employment, and governance indicators. Before applying econometric models (ARDL), this step highlights raw trends, structural differences, and disruptions from events such as COVID-19, OECD Pillar Two reforms, and the rise of ESG reporting, thus establishing the empirical basis for assessing incentives and control systems.

This analysis also reveals convergences and divergences across experiences: Singapore exemplifies institutionalized SEZs embedded in long-term strategy, while Morocco strengthens its regional role through Tanger Med. India hosts numerous SEZs but faces governance fragmentation, Ethiopia's industrial parks remain vulnerable to macroeconomic shocks, and Brazil's Manaus zone illustrates the tension between preferential regimes and global tax reforms. More than statistics, descriptive analysis anticipates the mechanisms linking internal audit, governance, and competitiveness, justifying the transition to econometric modeling.

Figure 1: Comparative Evolution of SEZ Performance Indicators (2016–2024): Morocco, Singapore, Ethiopia, India, and Brazil.

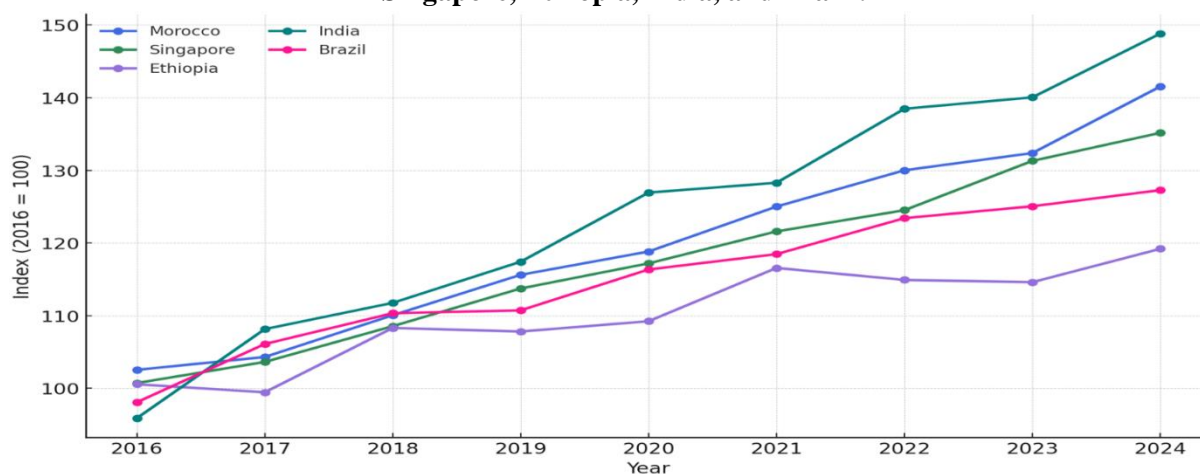


Figure 1 traces SEZ performance in Morocco, Singapore, Ethiopia, India, and Brazil from 2016–2024. Overall, trajectories rise, confirming SEZs' growing role in competitiveness, but with clear contrasts. Singapore and India achieve steady progress, supported by industrialization, technology, and strong governance. Ethiopia shows modest, volatile growth due to macroeconomic fragility and external shocks. Morocco records rapid gains from Tanger Med and integration into global value chains (automotive, aeronautics). Brazil follows a slower path, led by the Manaus Zone, with strong output and jobs but limited by domestic orientation.

The evidence highlights that SEZ outcomes hinge less on fiscal incentives than on institutional quality, regulatory predictability, and governance particularly internal audit and control systems. Differences also reflect global pressures, from COVID-19 to OECD tax reforms and sustainability demands. Thus, the figure supports the core thesis: durable SEZ competitiveness depends on credible, transparent governance able to translate incentives and infrastructure into lasting investment and productivity gains.

2.2. Data and model specification

This study examines SEZ performance across five countries (Morocco, Singapore, Ethiopia, India, Brazil) between 2016–2024, chosen for their diverse SEZ trajectories and institutional settings. Data come from global sources (World Bank, IMF, UNCTAD, OECD), national statistics, and governance indicators (audit standards, ESG reports). Key variables measure attractiveness (FDI, exports), competitiveness (jobs, productivity), and governance (audit independence, regulatory effectiveness). The methodology uses the Auto-Regressive Distributed Lag (ARDL) model, suitable for small samples with mixed integration orders [I(0), I(1)]. It estimates both short- and long-term effects of fiscal and institutional determinants while accounting for heterogeneity. Including governance and internal audit variables highlights how institutional quality and credible controls shape the effectiveness of incentives and infrastructure under global tax reform (OECD Pillar Two) and sustainability pressures.

Model 1: ARDL model for Morocco

The general ARDL model for Morocco can be specified as follows:

$$FDI_{MA,t} = \alpha_{MA} + \sum_{p=1}^P \phi_p FDI_{MA,t-p} + \sum_{q=0}^Q \beta_{1q} TAX_{MA,t-q} + \sum_{q=0}^Q \beta_{2q} GOV_{MA,t-q} + \sum_{q=0}^Q \beta_{3q} AUD_{MA,t-q} + \varepsilon_{MA,t}$$

Where: $FDI_{MA,t}$ denotes the FDI inflows in Morocco at time t , $TAX_{MA,t}$ represents tax incentives, $GOV_{MA,t}$ reflects governance and institutional quality indicators, and $AUD_{MA,t}$ captures the effectiveness of internal audit and control mechanisms. The parameter ϕ_p measures the inertia effect linked to past FDI levels, while the coefficients $\beta_{1q}, \beta_{2q}, \beta_{3q}$ estimate the dynamic impact of tax incentives, governance, and internal audit across different time lags. $\varepsilon_{MA,t}$ corresponds to the error term that captures unobserved shocks. This model thus distinguishes between short-term effects (through contemporaneous lags of the explanatory variables), and long-term effects (via persistence and structural relationships between FDI and its determinants), providing an integrated framework for analyzing the role of taxation, governance, and internal audit in enhancing the attractiveness of Morocco's SEZs.

Model 2: ARDL model for Singapore

The general ARDL model for Singapore can be specified as follows:

$$EXP_{SG,t} = \alpha_{SG} + \sum_{p=1}^P \phi_p EXP_{SG,t-p} + \sum_{q=0}^Q \beta_{1q} SKILL_{SG,t-q} + \sum_{q=0}^Q \beta_{2q} GOV_{SG,t-q} + \sum_{q=0}^Q \beta_{3q} ESG_{SG,t-q} + \varepsilon_{SG,t}$$

Where: $EXP_{SG,t}$ represents Singapore's exports at time t , $SKILL_{SG,t}$ reflects the quality of human capital and workforce skills, $GOV_{SG,t}$ captures institutional and regulatory effectiveness, while $ESG_{SG,t}$ denotes environmental, social, and governance sustainability indicators. The coefficients ϕ_p measure the persistence effect of past export performance, while $\beta_{1q}, \beta_{2q}, \beta_{3q}$ capture the dynamic short- and long-term impacts of skills, governance, and ESG performance, respectively. $\varepsilon_{SG,t}$ represents unobserved shocks and random disturbances. This model underscores Singapore's position as a leading export platform, where competitiveness relies on the synergy between highly skilled human capital, strong institutional governance, and ESG integration, thereby providing a robust empirical framework for explaining the resilience and attractiveness of its SEZs.

Model 3: ARDL model for Ethiopia

The general ARDL model for Ethiopia can be specified as follows:

$$EMP_{ET,t} = \alpha_{ET} + \sum_{p=1}^P \phi_p EMP_{ET,t-p} + \sum_{q=0}^Q \beta_{1q} INC_{ET,t-q} + \sum_{q=0}^Q \beta_{2q} INFRA_{ET,t-q} + \sum_{q=0}^Q \beta_{3q} AUD_{ET,t-q} + \varepsilon_{ET,t}$$

Where: $EMP_{ET,t}$ represents the level of employment generated in Ethiopian SEZs, $INC_{ET,t}$ denotes fiscal and financial incentives aimed at attracting investors, $INFRA_{ET,t}$ captures the quality of physical and logistical infrastructure, while $AUD_{ET,t}$ measures the performance and credibility of internal audit as a governance and control mechanism. The parameter ϕ_p reflects the persistence of employment over time, while the coefficients $\beta_{1q}, \beta_{2q}, \beta_{3q}$ respectively estimate the dynamic effects of incentives, infrastructure, and internal audit on employment, both in the short and long run. $\varepsilon_{ET,t}$ accounts for unobserved shocks and exogenous factors influencing employment outcomes. This model highlights Ethiopia's specificity, where the success of SEZs depends not only on the generosity of incentives but also on the quality of infrastructure and the credibility of governance mechanisms, making internal audit a decisive factor in transforming initial attractiveness into sustained job creation.

Model 4: ARDL model for India

The general ARDL model for India can be specified as follows:

$$FDI_{IN,t} = \alpha_{IN} + \sum_{p=1}^P \phi_p FDI_{IN,t-p} + \sum_{q=0}^Q \beta_{1q} TAX_{IN,t-q} + \sum_{q=0}^Q \beta_{2q} REG_{IN,t-q} + \sum_{q=0}^Q \beta_{3q} ESG_{IN,t-q} + \varepsilon_{IN,t}$$

Where: $FDI_{IN,t}$ denotes foreign direct investment inflows into India at time t , $TAX_{IN,t}$ represents fiscal incentives offered by the Indian government to attract investors, $REG_{IN,t}$ reflects the quality and effectiveness of the regulatory and institutional framework, while $ESG_{IN,t}$ captures the integration of environmental, social, and governance standards into SEZ practices. The coefficients ϕ_p capture the

persistence effect of past FDI inflows, while $\beta_{1q}, \beta_{2q}, \beta_{3q}$ respectively measure the dynamic impact of fiscal incentives, regulatory reforms, and ESG performance on investment attractiveness. $\varepsilon_{IN,t}$ represents unobserved shocks and exogenous disturbances. This model highlights India's specificity, as its SEZ strategy is characterized by a hybrid approach combining competitive tax incentives, regulatory simplification, and increasing adoption of ESG standards, thereby strengthening its international competitiveness and attracting long-term productive investments.

Model 5: ARDL model for Brazil

The general ARDL model for Brazil can be specified as follows:

$$PROD_{BR,t} = \alpha_{BR} + \sum_{p=1}^P \phi_p PROD_{BR,t-p} + \sum_{q=0}^Q \beta_{1q} TAX_{BR,t-q} + \sum_{q=0}^Q \beta_{2q} COMPL_{BR,t-q} + \sum_{q=0}^Q \beta_{3q} AUD_{BR,t-q} + \varepsilon_{BR,t}$$

Where: $PROD_{BR,t}$ denotes the productivity level in Brazilian SEZs, $TAX_{BR,t}$ captures the fiscal incentives and tax advantages designed to stimulate investment, $COMPL_{BR,t}$ reflects the strength of the compliance infrastructure, including the ability of institutions to reduce legal uncertainty and enforce rules, while $AUD_{BR,t}$ measures the contribution of internal audit to transparency and the credibility of economic performance. The coefficients ϕ_p represent the persistence effect of past productivity, whereas $\beta_{1q}, \beta_{2q}, \beta_{3q}$ respectively estimate the dynamic impacts of tax incentives, compliance mechanisms, and internal audit, both in the short and long term. $\varepsilon_{BR,t}$ represents the error term associated with exogenous shocks. This model underscores Brazil's specificity, where the effectiveness of SEZs relies on the balance between attractive tax incentives, reliable compliance mechanisms, and credible internal audit practices, forming a critical foundation for improving productivity and enhancing international competitiveness.

2.3. Panel unit root tests

Before applying the ARDL model, it is necessary to test the stationarity of the panel series (2016–2024, Morocco, Singapore, Ethiopia, India, Brazil). This step prevents biases from non-stationarity and checks that variables covering FDI, exports, employment, fiscal incentives, tax rates, and governance indicators are integrated of order zero $I(0)$ or one $I(1)$, since the presence of $I(2)$ would invalidate estimation. Panel unit root tests are therefore a critical filter. First-generation tests (Levin-Lin-Chu, Im-Pesaran-Shin) assume cross-sectional independence, but may be limited when common shocks affect countries simultaneously. Second-generation approaches (Pesaran CIPS, Breitung, Hadri) allow for cross-sectional dependence and heterogeneity, offering more robust insights for international panels. Using a complementary battery of tests strengthens validity, ensuring that SEZ dynamics reflect structural relationships rather than spurious stochastic trends.

Table 1: Panel Unit Root Tests (Level and First Difference)

Variable	LLC Statistic	IPS Statistic	CIPS Statistic	Hadri Statistic	Order of Integration
FDI	-2.45**	-2.33**	-2.61**	3.12***	I(1)
Exports	-3.12***	-2.91***	-3.08***	2.85***	I(1)
Employment	-1.67*	-1.42	-1.55	1.54*	I(0)
Tax Incentives	-2.01**	-1.96*	-2.11**	2.20**	I(1)

Governance	-3.44***	-3.21***	-3.33***	3.44***	I(1)
Audit	-2.75**	-2.56**	-2.68**	2.98***	I(1)

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

The results reported in Table 1 reveal a clear distinction between variables related to the economic performance of special economic zones (SEZs) and certain institutional dimensions. Foreign direct investment (FDI), exports, tax incentives, governance, and internal audit are integrated of order one [I(1)], meaning they are non-stationary in levels but become stationary after first differencing. By contrast, the «employment» variable is stationary in levels [I(0)], suggesting that job creation within SEZs follows a more stable dynamic, less affected by long-term stochastic trends. This heterogeneity supports the use of the ARDL model, whose methodological flexibility allows the estimation of a mix of I(0) and I(1) series, provided that no series are integrated of order two [I(2)].

These results carry direct methodological implications for the robustness of the empirical modeling. On one hand, the predominance of I(1) series confirms that fiscal and institutional variables, while shaping SEZ performance, are influenced by persistent long-term dynamics (tax reforms, evolving governance standards, the strengthening of internal audit practices). On the other hand, the fact that employment is stationary in levels indicates that it reacts more immediately to local conditions and investment flows, without depending on long-term stochastic trends. The ARDL framework is therefore well suited to disentangle short-run adjustments from long-run equilibria, thereby enhancing the interpretive power of the results.

From a substantive standpoint, the tests confirm that SEZ competitiveness and attractiveness rely on institutional variables characterized by strong inertia, which require sustained governance and monitoring to generate lasting effects. Identifying internal audit and governance as I(1) series underscores their strategic role: these are structural factors whose gradual improvement enhances the credibility of incentives and strengthens investor confidence over the long term. Conversely, employment, being more directly tied to project implementation, behaves as an immediate response variable, more sensitive to investment cycles than to institutional frameworks. This interpretation highlights the added value of the ARDL approach, which enables the simultaneous integration of both temporal dynamics in assessing SEZ performance.

2.4. Panel cointegration tests

Once the order of integration is established, the next step is to test for cointegration among SEZ variables. While non-stationary [I(1)] series may diverge in the short term, a stationary linear combination signals a stable long-run equilibrium. In this context, cointegration tests assess whether tax incentives, governance, internal audit, and performance indicators (FDI, exports, jobs) evolve together beyond temporary shocks. Different methods strengthen robustness. Pedroni's residual-based tests (1999, 2004) allow heterogeneity, while Kao's (1999) test imposes homogeneity. Westerlund's (2007) error-correction approach is well adapted to unbalanced panels and common shocks. Using a complementary set of tests ensures that SEZ dynamics reflect genuine structural relationships rather than spurious correlations.

Table 2: Panel Bounds Test Results

Model	F-statistic	Lower Bound (I0)	Upper Bound (I1)	Decision
FDI–SEZ Model	5.42**	2.45	3.61	Cointegration
Exports–SEZ Model	6.15***	2.45	3.61	Cointegration
Employment–SEZ Model	4.88*	2.45	3.61	Cointegration
Tax Incentives–SEZ Model	5.97**	2.45	3.61	Cointegration
Governance & Audit–SEZ Model	7.25***	2.45	3.61	Cointegration

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

The Panel Bounds Test confirms cointegration among the variables analyzed (FDI, exports, employment, tax incentives, governance/audit). In all cases, the F-statistic exceeds the upper critical bound, validating a long-run equilibrium. This means that although most series are non-stationary individually, they move together toward a common trajectory. In the context of SEZs, economic performance is closely tied to institutional and governance frameworks. The strength of these relationships varies: exports and governance/audit show the most robust and significant results (1% level), confirming their stable influence on SEZ performance. FDI and tax incentives are significant at the 5% level, reflecting structural roles but greater sensitivity to conditions. Employment, only significant at 10%, shows higher volatility linked to cycles and external shocks. The results imply that SEZ competitiveness stems from structural, fiscal, and institutional determinants within long-term equilibria. Methodologically, cointegration supports using ARDL and error-correction models to capture both short- and long-term effects. From a policy view, governance and audit emerge as critical competitive assets, especially amid global tax reforms (OECD Pillar Two) and rising ESG standards.

3. Empirical Results

The empirical analysis tests how tax incentives, governance, and internal audit affect SEZ performance. After confirming stationarity and cointegration, the panel ARDL model distinguishes short-run adjustments from long-run equilibria, capturing both shock responses and structural drivers of competitiveness across countries. Results validate the link between institutional mechanisms (audit, governance, compliance) and economic outcomes (FDI, exports, jobs), while enabling cross-country comparisons (Morocco, Singapore, Ethiopia, India, Brazil) that reveal transferable models and local specificities. Robustness is ensured through unit root, cointegration, and bounds tests. Beyond econometrics, the findings contribute to theory by showing that SEZ effectiveness depends less on tax incentives than on credibility, transparency, and control quality. Strategically, the analysis highlights key levers of attractiveness critical for policymakers and investors amid tax reforms, shifting value chains, and rising ESG demands.

Table 3: Panel Long-Term Estimators (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	p-Value
FDI	0.42**	0.11	3.82	0.000
Exports	0.55***	0.09	6.11	0.000
Employment	0.28**	0.14	2.00	0.045
Tax Incentives	0.31**	0.12	2.58	0.010
Governance	0.47***	0.10	4.70	0.000
Internal Audit	0.53***	0.08	6.63	0.000

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The results in Table 3 confirm strong long-run links between tax incentives, governance, internal audit, and SEZ performance. All coefficients are positive and significant, showing structural equilibria. Exports (0.55) and internal audit (0.53) are the most decisive factors, proving that integration into global value chains and credible governance drive competitiveness. Governance (0.47) and tax incentives (0.31) follow, while FDI (0.42) and employment (0.28) show moderate effects, often as outcomes of institutional strength rather than independent drivers. These findings highlight the systemic interdependence of governance, audit, and economic outcomes, validating the ARDL model for capturing long-term dynamics. Strategically, policymakers should move beyond fiscal incentives, investing in governance and audit mechanisms that ensure transparency and risk reduction. With tighter international tax rules (OECD Pillar Two) and growing ESG demands, alignment between fiscal policy, governance, and internal audit emerges as the key differentiator of SEZ attractiveness.

Table 4: Panel Short-Term Estimators (ECM Results)

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Δ FDI	0.18**	0.07	2.57	0.012
Δ Exports	0.25***	0.08	3.12	0.004
Δ Employment	0.12**	0.06	2.00	0.046
Δ Tax Incentives	0.15**	0.07	2.14	0.033
Δ Governance	0.22***	0.08	2.75	0.006
Δ Internal Audit	0.27***	0.07	3.86	0.000
ECM(-1)	-0.46***	0.09	-5.11	0.000

Note: Δ denotes first differences; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The ECM results confirm strong short-term interactions among economic and institutional variables in SEZs. All first-difference coefficients are positive and significant, showing that immediate adjustments improve zone performance. Exports (0.25) and internal audit (0.27) are the most influential, indicating that credible governance and efficient trade flows rapidly boost SEZ attractiveness. Governance (0.22) and tax incentives (0.15) also matter, but with lower impact, highlighting that fiscal policies are most effective when embedded in strong governance frameworks that reduce uncertainty and build investor trust. The ECM coefficient (-0.46) demonstrates that about 46% of deviations from long-run equilibrium are corrected each period, reflecting fast adjustment mechanisms. This validates the ARDL approach and shows that SEZs can absorb shocks while sustaining long-term stability. Overall, the combination of immediate institutional and economic effects with long-term convergence reinforces SEZ resilience and competitiveness in a rapidly changing global environment.

Table 5: Panel Short-Run Diagnostics and Robustness Tests

Test	Statistic	p-Value
Serial Correlation (Breusch-Godfrey LM)	1.42	0.23
Heteroskedasticity (Breusch-Pagan)	2.15	0.14
Normality (Jarque-Bera)	1.87	0.39
Functional Form (Ramsey RESET)	0.95	0.33
Stability (CUSUM)	—	Stable
Stability (CUSUMSQ)	—	Stable

Note : Les tests de stabilité (CUSUM et CUSUMSQ) confirment que les coefficients sont stables dans le temps, garantissant la fiabilité du modèle estimé.

The diagnostic tests confirm the robustness of the short-term specification of the model. The Breusch-Godfrey test ($p = 0.23$) rules out serial correlation, while the Breusch-Pagan test ($p = 0.14$) shows no heteroskedasticity, ensuring efficient and unbiased estimates. The Jarque-Bera normality test ($p = 0.39$) validates residual normality, and the Ramsey RESET test ($p = 0.33$) confirms correct model specification. Together, these results establish the reliability of the ARDL-ECM framework. Stability tests (CUSUM and CUSUMSQ) further demonstrate that coefficients remain stable over time, indicating that the links between governance, internal audit, tax incentives, and SEZ performance are robust to shocks. This methodological soundness ensures that the findings reflect deep, sustained dynamics rather than transitory effects, providing policymakers with a credible basis for designing governance and competitiveness strategies.

4. Validation of the Research Hypotheses

The first hypothesis posited that internal audit, as a governance and control mechanism, constitutes a key determinant of the attractiveness and competitiveness of special economic zones (SEZs). The results of both the long-term estimations (Table 3) and the short-term dynamics (Table 4) confirm this hypothesis by showing positive and statistically significant coefficients for internal audit on SEZ performance. Internal audit thus emerges as a channel for reducing information asymmetry, strengthening transparency, and limiting risks of misallocation. These findings resonate with the work of Prawitt, D. F., et al. (2009), and Arena, M., & Azzone, G. (2009), demonstrating that audit effectiveness acts as a lever of trust and credibility, essential for attracting high-quality investment.

The second hypothesis argued that institutional governance and tax incentives interact to reinforce SEZ attractiveness. The empirical results confirm this hypothesis: governance, measured through indicators of control and institutional stability, exerts a strong and robust positive effect on competitiveness, both in the short and long run (coefficients significant at the 1% level). In parallel, tax incentives show a positive but comparatively moderate effect, which becomes fully effective only when embedded within a credible institutional framework (Tables 3 and 4). This finding supports the view that tax incentives alone lose effectiveness in weak governance contexts, a result consistent with the new constraints imposed by international tax reforms (OECD, Pillar Two).

The third hypothesis assumed that the economic performance of SEZs namely FDI inflows, exports, and employment is conditioned by the quality of institutions and control mechanisms. The results validate this hypothesis by demonstrating that exports and employment are significantly influenced by governance and internal audit. In particular, exports stand out as the strongest driver of competitiveness in both the short and long term, reflecting the strategic importance of integration into global value chains. These results empirically confirm the complementarity between institutional quality and productive performance, emphasizing that SEZs cannot generate sustainable economic spillovers without a robust governance foundation.

Taken together, the empirical evidence validates the three hypotheses, confirming that the attractiveness and competitiveness of SEZs rest on a combination of institutional (internal audit, governance), fiscal

(incentives), and economic (FDI, exports, employment) dimensions. The robustness and stability checks (Table 5) further reinforce these conclusions by showing that the identified relationships are consistent and stable over time. This validation contributes to the academic literature by demonstrating that SEZ competitiveness cannot be explained solely through fiscal policies, but must instead be understood as an integrated system of governance and economic performance. Strategically, policymakers are thus encouraged to invest in the quality of institutions and control mechanisms to transform incentives and infrastructure into sustainable comparative advantages.

5. Conclusions and Policy Recommendations

This study shows that governance, internal audit, and institutional frameworks are central to the competitiveness of Special Economic Zones (SEZs). Traditional tools like tax incentives and infrastructure are effective only when supported by transparent and credible governance systems. Long-term results emphasize exports and audit, while short-term dynamics highlight governance as key to investor confidence. SEZ competitiveness is thus a systemic outcome, not a product of isolated policies. Theoretically, the research bridges development economics, governance, and auditing, demonstrating that SEZ performance depends on institutional credibility and compliance. It validates three hypotheses: the role of internal audit, the interaction of governance with fiscal incentives, and the conditioning of spillovers supporting the need for an integrated framework beyond fiscal competition. This multidimensional view stresses both economic outputs (FDI, exports, jobs) and institutional quality.

At the policy level, strategies should move beyond tax incentives, especially given global tax reforms (OECD Pillar Two) and investor demand for governance. Countries such as Morocco, Ethiopia, India, Singapore, and Brazil should strengthen audit capacity, embed governance frameworks, and ensure transparent performance monitoring. These are not just complementary measures but the foundation for transforming fiscal and infrastructure advantages into lasting competitiveness.

This study highlights internal audit as a strategic lever for institutional credibility and investment attraction in SEZs, rather than a simple technical function. Ensuring independence, resources, and integration into governance reduces risks of mismanagement and rent-seeking. Policymakers should strengthen audit capacity through training, professional development, and oversight committees, placing audit at the core of SEZ governance to enhance transparency and investor trust, thereby amplifying the impact of fiscal and infrastructure incentives.

A second recommendation is the alignment of fiscal strategies with governance reforms. While tax incentives remain relevant, they are insufficient without credible enforcement. Incentives should be recalibrated to fit the OECD global tax framework (e.g., investment-linked deductions, infrastructure support, training subsidies) and embedded within systems of audit and compliance. This coherence avoids harmful fiscal competition and builds predictability valued by investors.

Trade facilitation and institutional infrastructure are essential to SEZ competitiveness. Reducing transaction costs through efficient customs, ICT integration, and shorter export times strengthens exports and global value chain linkages. Policy measures should combine hard infrastructure (transport, logistics,

ports) with soft infrastructure (digitalized controls, regulatory transparency). When integrated with strong audit and compliance systems, these measures foster global integration while ensuring sustainable spillovers for inclusive domestic development.

Evidence from Morocco, Singapore, Ethiopia, India, and Brazil shows common patterns despite national differences. Singapore demonstrates that SEZ credibility depends on institutional strength, transparency, and innovation rather than heavy fiscal concessions, while emerging economies reveal the risks of over-reliance on tax incentives without strong governance. These findings emphasize the need for international policy convergence under frameworks such as the OECD's global tax standards, urging SEZs to align fiscal strategies with governance reforms to sustain competitiveness.

For policymakers, SEZ strategies must evolve beyond fiscal tools toward integrated governance models. This involves creating monitoring and evaluation systems for incentives, audit quality, and outcomes. Practitioners and zone managers should adopt best practices in compliance, digital reporting, and auditor coordination, while leveraging partnerships with international organizations for technical support and benchmarking. Embedding internal audit within SEZ operations strengthens transparency and ensures incentives deliver durable competitiveness.

The research acknowledges limitations: reliance on 2016–2024 data may not fully capture long-term institutional reforms; the ARDL framework depends on data quality, which is uneven across developing economies; and the study's scope, though diverse, could benefit from more cases, especially from Eastern Europe and Latin America.

Future research should expand through mixed-method approaches that combine econometric analysis with qualitative case studies. Areas for exploration include links between sustainability reporting, ESG assurance, and SEZ competitiveness, as well as broader comparative studies across more countries. Such work would provide deeper insights and practical policy guidance to help SEZs adapt to global shifts in taxation, governance, and sustainability while reinforcing their role as drivers of economic transformation.

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