

Towards an Integrated Measurement of Territorial Performance: Contributions of a Composite Index Applied to the Laâyoune- Sakia El Hamra Region

Vers une mesure intégrée de la performance territoriale : apports d'un indice composite appliqué à la Région de Laâyoune-Sakia El Hamra

BENTALEB Lahoucine

Ph.D. in Economics

Faculty of Legal, Economic and Social Sciences

Cadi Ayyad University, Marrakesh, Morocco.

INREDD (Research Laboratory in Innovation, Responsibilities and Sustainable Development)

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Abstract

Measuring territorial performance remains a methodological challenge in regional development research, particularly in data-constrained contexts. This study aims to construct a multidimensional Integrated Territorial Performance Index (ITPI) capturing the interplay between economic efficiency, social cohesion, and perceived territorial value in the Laâyoune-Sakia El Hamra region. The methodological approach relies on Min–Max normalization, equal weighting, and geometric aggregation, applied to regional data over the period 2014–2023. The findings reveal a significant improvement in overall territorial performance, with the ITPI rising from 0.37 in 2014 to 0.55 in 2023, driven primarily by economic efficiency gains. However, social cohesion remains fragile and declines over time, highlighting persistent structural imbalances in terms of unemployment.

Key Words: Integrated Territorial Performance Index; Composite indicator; Economic efficiency; Social cohesion; Perceived value.

Résumé

La mesure de la performance territoriale constitue un défi méthodologique majeur dans le domaine de la recherche sur le développement régional, particulièrement dans les contextes caractérisés par des contraintes de données. Cette étude vise à construire un Indice Intégré de Performance Territoriale (IIPT) multidimensionnel, appréhendant les interactions entre l'efficacité économique, la cohésion sociale et la valeur territoriale perçue dans la région de Laâyoune-Sakia El Hamra. La démarche méthodologique repose sur la normalisation Min-Max, une pondération égale et une agrégation géométrique, appliquées aux données régionales sur la période 2014–2023. Les résultats révèlent une amélioration significative de la performance territoriale globale, l'IIPT progressant de 0,37 en 2014 à 0,55 en 2023, sous l'impulsion principalement des gains d'efficacité économique. Toutefois, la cohésion sociale demeure fragile et se dégrade sur l'ensemble de la période, mettant en évidence des déséquilibres structurels persistants en matière de chômage.

Mots-clés : Indice Intégré de Performance Territoriale ; Indicateur composite ; Efficacité économique ; Cohésion sociale ; Valeur perçue.

Introduction

Measuring regional performance has become a central issue in development economics, particularly in emerging and transition economies where territorial disparities affect economic efficiency, social cohesion, and long-term growth prospects. In a context of global transition marked by rising inequality, evolving societal expectations, and the quest for sustainability, traditional indicators such as GDP or real growth are no longer sufficient to reflect the complexity of regional dynamics. As Camagni (2009) and Capello and Nijkamp (2011) point out, territorial performance must incorporate economic, social, and environmental dimensions in order to capture competitiveness and attractiveness in a globalized world. International experience shows that a region can experience rapid growth in wealth without generating a corresponding improvement in employment, well-being, or perceived attractiveness. This has led to a growing interest in integrated approaches based on multidimensional composite indicators (OECD, 2008; Stiglitz, Sen, and Fitoussi, 2009).

The case of the Laâyoune–Sakia El Hamra region is emblematic of this issue. Despite registering regional GDP growth of 2.9% in 2022 (HCP, 2023) and a GDP per capita above the national average, the region remains characterized by a strong dependence on public expenditure and a weakly diversified sectoral structure, largely concentrated in phosphate extraction and maritime fishing activities. Moreover, it continues to face persistent structural vulnerabilities, particularly related to youth unemployment, the significant weight of the informal sector, and logistical dependence on northern regions. At the same time, the region benefits from strong logistical and commercial potential due to its strategic position at the crossroads of Euro-African flows (Benali, 2021). However, these economic advances coexist with persistent fragilities, as reflected in an unemployment rate exceeding 20% in 2021.

This apparent disconnect between wealth creation, employment dynamics, and perceived attractiveness raises a key research question: **To what extent can a composite index approach provide an integrated and replicable framework for measuring territorial performance by combining economic efficiency, social cohesion, and perceived value?**

While composite indicators have been widely used to address multidimensional measurement issues, they remain subject to important methodological limitations, particularly regarding sensitivity to normalization methods, weighting schemes, and aggregation techniques. Existing studies often rely on compensatory frameworks and provide limited robustness assessment, which may weaken the reliability of the results for policy use.

To address this gap, this paper proposes a robust and integrated composite index framework designed to assess territorial performance through three complementary dimensions: economic efficiency, social cohesion, and perceived value. The originality of the approach lies in the combination of non-compensatory aggregation and robustness validation techniques, including alternative weighting scenarios and jackknife resampling, thereby enhancing both methodological consistency and interpretability.

This paper contributes to the literature in three ways. First, it develops a multidimensional composite index integrating economic efficiency, social cohesion, and perceived value, offering a more comprehensive assessment of territorial performance. Second, it introduces a robustness framework combining non-compensatory aggregation with validation techniques, including alternative weighting scenarios and jackknife resampling, to address the sensitivity of composite indicators to methodological choices. Third, it provides empirical evidence from a developing regional context through the application to the Laâyoune–Sakia El Hamra region over the period 2014–2023, demonstrating the adaptability of the framework in data-constrained environments and its relevance for regional development policy.

The empirical application focuses on the Laâyoune–Sakia El Hamra region in Morocco over the period 2014–2023. Beyond this case study, the proposed framework is intended to be replicable and adaptable to other territorial contexts, particularly in data-constrained environments.

1. Literature Review

The assessment of territorial performance has evolved toward integrated frameworks that go beyond approaches focused solely on economic growth. Recent literature emphasizes the relevance of composite indicators combining economic, social, and territorial dimensions to analyze regional development trajectories, particularly in emerging economies. This section is situated within this perspective by mobilizing the main conceptual contributions related to multidimensional territorial development.

1.1. Territorial Performance: Concepts and Evaluation Approaches

The analysis of territorial performance is rooted in classical theories of regional growth. As early as the 1950s, Perroux (1955) introduced the concept of growth poles, according to which development spreads from leading sectors or territories, generating spillover effects throughout the economy. Building on this perspective, Boudeville (1966) and Hirschman (1958) highlighted the dynamics of regional imbalances and the crucial role of infrastructure, investment, and externalities in shaping territorial trajectories. These approaches rely

primarily on quantitative and economic indicators, such as GDP, sectoral growth, and productivity, which for a long time constituted the benchmark for measuring territorial performance.

However, exclusive reliance on these indicators has revealed significant limitations. On the one hand, a high level of GDP per capita does not necessarily guarantee improvements in social well-being or a reduction in territorial inequalities (Stiglitz, Sen, and Fitoussi, 2009). On the other hand, contemporary transformations related to globalization, sustainability, and social inclusion have increased the complexity of regional performance criteria (Capello and Nijkamp, 2011).

In this context, composite indicators have emerged as tools for integrating multiple dimensions of territorial performance. The Human Development Index (HDI) pioneered this approach by combining income, health, and education (UNDP, 1990), while the OECD (2008) provided a rigorous methodological framework based on normalization, weighting, and aggregation. These indicators are now widely used to assess broader dimensions such as regional competitiveness, sustainability, and territorial attractiveness (Camagni, 2009; Annoni and Dijkstra, 2019).

Thus, the evolution of thinking on territorial performance reflects a gradual shift from a classical, unidimensional perspective centered on growth and income toward a multidimensional and integrated approach that seeks to capture the complexity of territorial dynamics through composite indices.

1.2. Composite Indicators and Regional Economic Analysis

The growing complexity of territorial dynamics has led researchers and institutions to move beyond purely economic indicators by incorporating additional dimensions into their analytical frameworks. While efficiency, traditionally measured through GDP, productivity, or infrastructure, remains a fundamental pillar, it does not, on its own, adequately capture the sustainability or equity of regional development (Camagni, 2009; Capello and Nijkamp, 2011).

Territorial performance is increasingly understood as a multidimensional construct encompassing economic efficiency, social cohesion, and perceived value. Economic efficiency refers to a territory's capacity to generate and optimally allocate wealth, commonly assessed through indicators such as GDP per capita, sectoral growth, and logistical performance, particularly in strategic regions integrated into global value chains (Annoni and Dijkstra, 2019; Rodríguez-Pose, 2020). At the same time, the literature emphasizes that

economic dynamism does not necessarily translate into social inclusion: persistent unemployment, especially among young people, may generate social vulnerability and fuel what Rodríguez-Pose (2018) describes as a “geography of discontent,” highlighting the central role of employment in sustaining inclusive development (Stiglitz, Sen, and Fitoussi, 2009).

Perceived value reflects a territory’s capacity to attract firms, investment, and skills through entrepreneurial dynamics, investment flows, and territorial image (Kavaratzis and Ashworth, 2005). Integrating economic efficiency, social cohesion, and perceived attractiveness within composite indicators provides a more balanced assessment of regional dynamics and supports the view of territorial performance as a systemic process shaped by the interaction of these dimensions (OECD, 2008; Camagni, 2017).

Innovation, governance, human capital, pillars translate four interrelated notions of regional science. Territorial capital (Camagni, 2009) is the stock of regional assets; regional competitiveness (Gardiner, Martin and Tyler, 2004) — captured by the economic efficiency pillar — is the capacity to valorize it; territorial attractiveness — operationalized by the perceived value pillar (Kavaratzis and Ashworth, 2005) — expresses its external recognition; and inclusive development (Rodríguez-Pose, 2018) — the social cohesion pillar — conditions its sustainability. The ITPI thus formalizes a circular relationship among these notions rather than a mere juxtaposition of dimensions.

1.3. Gaps in Existing Approaches and Rationale for the ITPI

Despite significant academic and institutional advances, important gaps remain in the assessment of territorial performance. Most composite indicators still prioritize economic and institutional dimensions, giving limited attention to social aspects and perceived attractiveness (Annoni and Dijkstra, 2019), and are largely developed for European or North American contexts, overlooking the specific challenges of emerging regions (Rodríguez-Pose, 2018; Camagni, 2017). In Morocco, existing measures remain mostly confined to macroeconomic aggregates, without being embedded in a genuinely multidimensional analytical framework.

In the case of the Laâyoune–Sakia El Hamra region, the available literature is both scarce and fragmented. Existing studies mainly emphasize the scale of public investment and logistical potential, without proposing integrated measurement tools capable of jointly assessing economic efficiency, social cohesion, and territorial attractiveness. This gap hinders a nuanced reading of the region’s development trajectories and constrains policymakers’ ability to design targeted and evidence-based interventions.

Against this backdrop, this study proposes an Integrated Territorial Performance Index (ITPI) that combines economic efficiency, social cohesion, and perceived value within a unified framework. The index relies on a rigorous methodology based on Min–Max normalization, equal weighting, geometric aggregation, and sensitivity analysis, and is empirically applied to the Laâyoune–Sakia El Hamra region over the period 2014–2023, thereby contributing to broader debates on the measurement of territorial performance in emerging economies.

Recent work on territorial performance emphasizes the relevance of multidimensional approaches based on composite indices to analyze differentiated regional trajectories. These contributions also highlight the need to adapt analytical frameworks to the data constraints characteristic of emerging economies, in order to produce territorial diagnostics that are both policy-relevant and comparable over time.

Compared with existing measures, the ITPI differs in three respects: unlike the HDI (UNDP, 1990), it operates at the infra-national scale and integrates perceived attractiveness; unlike the EU Regional Competitiveness Index (Annoni and Dijkstra, 2019), it relies on a parsimonious architecture suited to data-constrained regions; and unlike most additive, fully compensatory composite indicators, it combines two-level geometric aggregation with an explicit robustness protocol (alternative weighting and jackknife resampling). Its contribution thus lies in this transferable combination rather than in a new aggregation technique per se.

2. Methodology

Consistent with a research question formulated in terms of 'to what extent', the study adopts a positivist stance and a quantitative, confirmatory design based on secondary regional data. This section presents the methodology and data used to assess the territorial performance of the Laâyoune–Sakia El Hamra region. It outlines the process for constructing the Integrated Territorial Performance Index, the selection of indicators and statistical sources, as well as the validation procedures adopted.

2.1. Construction of the Integrated Territorial Performance Index (ITPI)

Territorial performance is understood as the capacity of a given area to generate wealth, transform it into collective well-being, and enhance its attractiveness to economic and social actors. Within this perspective, this study proposes an Integrated Territorial Performance Index structured around three complementary pillars, each reflecting a key dimension of regional development.

- Economic efficiency :

Economic efficiency refers to a territory's capacity to mobilize productive resources to generate added value. In this study, it is operationalized through GDP per capita, economic growth, and the logistical performance of the Port of Laâyoune. Theoretically, this dimension aligns with the concept of productive capital and the "spillover effects" inherent to development poles, as theorized by Perroux (1955) and Camagni (2009).

- Social cohesion:

Social cohesion denotes a territory's capacity to translate economic growth into inclusive opportunities for its population. Within this framework, it is primarily measured via the regional unemployment rate, serving as a synthetic indicator of the labor market's absorption capacity. This dimension is rooted in the academic debate on the nexus between growth and inclusion, where persistent social deficits are understood to undermine the long-term sustainability of regional development (Rodríguez-Pose, 2018).

- Perceived value :

Perceived value reflects a territory's attractiveness to investors and entrepreneurs, encompassing business creation and projects approved by the Regional Investment Center (CRI). Rooted in place marketing literature, this dimension emphasizes how a region's image and reputation decisively influence the strategic allocation of resources (Kavaratzis and Ashworth, 2005).

The originality of the ITPI lies in the systematic integration of these three dimensions within a single analytical framework. Unlike conventional approaches focused exclusively on economic performance, the ITPI adopts a multidimensional perspective in which each pillar is essential and non-substitutable. The use of geometric aggregation at both the indicator and pillar levels is specifically intended to limit excessive compensability: strong economic performance cannot offset social deficits or insufficient territorial attractiveness. This conceptual framework is aligned with the recommendations of the Stiglitz–Sen–Fitoussi Commission (2009) and the OECD (2008) on composite indicators, which emphasize the need to move beyond traditional economic aggregates in order to capture the complexity of territorial development trajectories.

2.2. Selection of Indicators, Data Sources, and Normalization

The selection of variables is grounded in the existing literature on composite indicators and territorial performance assessment. Numerous studies have demonstrated that territorial

performance is inherently multidimensional and relies on three complementary axes: economic efficiency, social cohesion, and perceived attractiveness.

Table N° 1: Pillars of the Integrated Territorial Performance Index and Selected Variables

Pillars	Selected Variables	Data Sources	References
<i>Economic Efficiency</i>	- Regional GDP per capita (MAD) - Real growth rate of regional GDP (%) - Share of the Port of Laâyoune in national traffic (%)	HCP (regional accounts), Bank Al-Maghrib (BAM), National Ports Agency (ANP)	(Annoni & Dijkstra, 2019), Camagni, 2009
<i>Social Cohesion</i>	- Regional unemployment rate (%)	HCP (social indicators, labor force surveys)	Stiglitz-Sen-Fitoussi (2009), Rodríguez-Pose (2018)
<i>Perceived Value</i>	- Business creation - Value of approved investments - Projected employment	-OMPIC (business statistics) -Laâyoune Regional Investment Center (CRI) (annual reports)	Kavaratzis et Ashworth, 2005

Source : Own elaboration

The table above illustrates the overall structure of the Integrated Territorial Performance Index. As such, the index follows the logic of multidimensional composite indicators (OECD, 2008), while adapting it to the Moroccan regional scale by combining three complementary pillars.

The exclusion of innovation, governance, human capital, environmental and institutional dimensions rests on three considerations: no continuous regional series covers these fields in Morocco over 2014–2023, and national proxies would have introduced a measurement bias outweighing the informational gain; the OECD (2008) advises parsimony when time series are short; and the study focuses on the efficiency–cohesion–attractiveness triangle, identified above as the central tension of the region's development model. These dimensions remain priority avenues for extending the index (see Conclusion).

The monographic design proceeds from both method and data: several indicators port logistics and CRI-approved projects in particular are not measured comparably across the twelve Moroccan regions over 2014–2023, while the single-region focus permits a fine-grained reading of pillar interactions over a full decade. Comparative reach is nonetheless preserved: normalization bounds anchored to national reference values implicitly benchmark

the region, and the replicable architecture makes the interregional extension the formal test of the index's discriminating power the natural continuation of this agenda.

2.3. Weighting Scheme and Aggregation Method

The construction of a composite index requires ensuring the comparability of variables expressed in heterogeneous units (dirhams, percentages, number of firms). To this end, a normalization step is essential.

2.3.1. Normalization

For data normalization, the Min–Max method is adopted. This approach consists of transforming each raw value $X_{i,t}$ into a standardized score bounded between 0 and 1, according to the following transformation:

$$Z_{i,t} = \frac{X_{i,t} - \min(X_i)}{\max(X_i) - \min(X_i)} \quad (Eq. 1)$$

This method is widely used in the literature on composite indicators (OECD, 2008; UNDP, 1990) as it facilitates the interpretation of results by expressing all variables on a common and intuitive scale.

For *cost-type indicators* (e.g., the unemployment rate), the normalized values are inverted so that higher scores systematically reflect better performance. In this case, the normalized score is computed as:

$$Z_{i,t}^* = 1 - Z_{i,t} \quad (Eq. 2)$$

Normalization bounds are defined in a transparent and plausible manner, based on the empirical distribution of regional data and national reference values (e.g., GDP per capita: MAD 30,000–90,000; unemployment rate: 5–25%).

This approach preserves relative disparities across regions and over time, while avoiding Z-score standardization, which relies on the restrictive assumption of normally distributed data.

2.3.2. Weighting

The second step consists in determining the relative weights assigned to each indicator and to each pillar. Several weighting approaches are discussed in the literature:

- **Equal weighting**, considered the most transparent option and widely used to avoid excessive subjectivity (OECD, 2008).
- **Empirical weighting**, based on statistical techniques such as principal component analysis.
- **Expert-based weighting**, relying on consensus-building methods (e.g., Delphi techniques or expert panels).

In this study, an equal-weighting scheme is adopted. Accordingly:

- Each indicator contributes equally to the sub-index of its respective pillar.
- Each pillar contributes equally to the overall Integrated Territorial Performance Index (ITPI).

Formally, the sub-index of pillar p at time t is computed as the geometric mean of its normalized indicators:

$$SI_{p,t} = (\prod_{i=1}^n Z_{i,t})^{1/n} \quad \text{where } p \in \{E, P, S\} \quad (Eq. 3)$$

Where $SI_{p,t}$ denotes the sub-index of pillar p and n represents the number of indicators included in that pillar.

$$ITPI_t = (SI_{E,t} \times SI_{S,t} \times SI_{P,t})^{1/3} \quad (Eq. 4)$$

Where $SI_{E,t}$, $SI_{S,t}$ and $SI_{P,t}$ denote the sub-indices of economic efficiency, social cohesion, and perceived value, respectively.

The use of the geometric mean is recommended in the composite indicator literature to limit perfect substitutability across dimensions (Stiglitz, Sen, and Fitoussi, 2009; Annoni and Dijkstra, 2019). Accordingly, weak performance in one pillar, particularly the social dimension cannot be fully offset by strong performance in other dimensions.

The choice of equal weighting aims to ensure methodological transparency and to avoid the introduction of subjective biases, in line with OECD (2008) recommendations. In the absence of a clear consensus on the relative hierarchy of territorial performance dimensions, this option is particularly appropriate in the context of emerging regions.

Equal weighting was not a default choice. Other schemes were on the table. Data-driven weights, principal components, entropy, look attractive on paper, but they collapse on ten annual observations: the loadings would shift with every new year of data (Decancq and Lugo, 2013; Greco et al., 2019). The Analytic Hierarchy Process? It needs a structured expert panel we did not have, and it brings its own subjectivity back in. As for 'benefit of the doubt' DEA, it lets each unit pick the weights that flatter it most (Cherchye et al., 2007), a real problem for an index built to compare performance over time. So equal weights it is, stress-tested by the (1–2–1) scenario and the jackknife resampling below. Data-driven weighting will earn its place later, once the index moves to a cross-regional panel.

Consequently, the validation of the ITPI also relies on examining its sensitivity to construction assumptions and assessing its internal robustness.

2.4. Sensitivity Analysis and Robustness Tests

Aggregation constitutes the final step in the construction of the Integrated Territorial Performance Index (ITPI) and combines the pillar-specific sub-indices into a single synthetic indicator. To this end, the geometric mean is applied at both the intra- and inter-pillar levels, in line with standard practice in the construction of multidimensional composite indices (Annoni and Dijkstra, 2019). This choice limits substitutability across dimensions and favors more balanced territorial development trajectories, the ITPI being computed as defined in Section 2.3.

To assess the sensitivity of the index to alternative weighting schemes, an additional scenario is considered in which greater importance is assigned to the social cohesion pillar (1–2–1). In this case, the ITPI is computed as:

$$ITPI_t^{(S \times 2)} = (SI_{E,t}^{\frac{1}{4}} \times SI_{S,t}^{\frac{2}{4}} \times SI_{P,t}^{\frac{1}{4}}) \quad (Eq. 5)$$

2.4.1. Sensitivity Analysis to Weighting Schemes

In order to assess the stability and reliability of the ITPI, a sensitivity analysis and an internal robustness test are implemented. The sensitivity analysis is based on a comparison between two pillar-weighting scenarios: a reference scenario with equal weights (1–1–1) and an alternative scenario that reinforces the social pillar (1–2–1). In parallel, internal robustness is evaluated using a jackknife test based on the successive exclusion of indicators. These procedures are designed to verify that the structure of the index remains stable under reasonable variations in the underlying construction assumptions.

Table N° 2: Comparison of ITPI Weighting Scenarios (2014–2023)

Year	ITPI (equal weights)	ITPI (social × 2)	Relative difference (%)
2014	0,37	0,35	-5,4
2016	0,42	0,39	-7,1
2018	0,46	0,42	-8,7
2020	0,46	0,40	-13,0
2021	0,49	0,43	-12,2
2023	0,55	0,49	-10,9

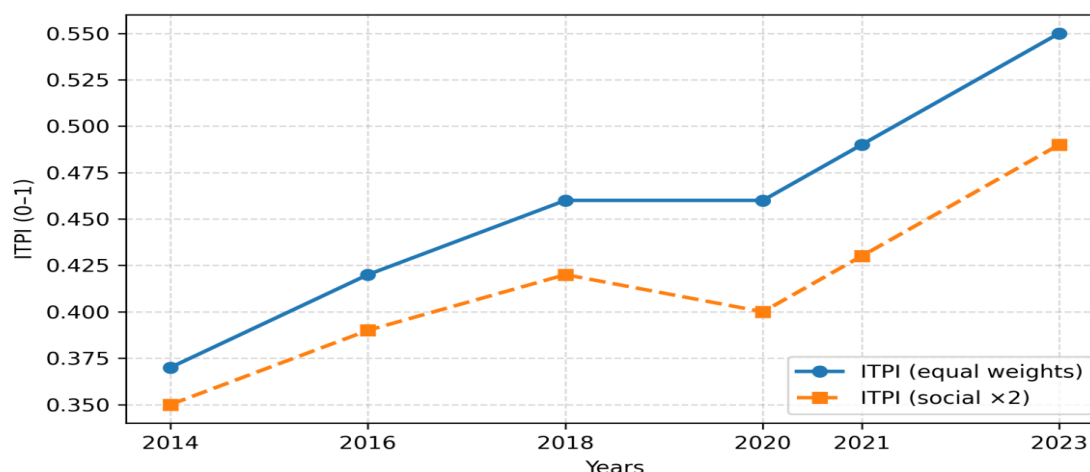
Source : Own elaboration

The table highlights a systematic variation in the value of the ITPI when the weighting of the social pillar is modified. This sensitivity indicates that the index responds consistently to changes in weighting without altering its overall trajectory, thereby confirming the relative stability of the index's structure.

The following figure graphically illustrates the differences induced by alternative weighting scenarios and allows for an assessment of the ITPI's sensitivity to the chosen weighting

schemes. The close alignment of the resulting trajectories indicates that the overall dynamics of the index remain consistent across weighting structures, thereby providing additional evidence of the methodological stability of the index.

Figure N° 1: ITPI: Reference Scenario vs. Reinforced Social Weighting



Source: Own elaboration

2.4.2. Internal Robustness Test (Jackknife Method)

In order to assess the structural stability of the ITPI, an internal robustness test based on the jackknife method is applied. This approach consists of recalculating the index after the successive exclusion of each indicator, with the aim of identifying any potential dependence of the index on a specific component.

To this end, the jackknife method, originally introduced by Maurice Quenouille (1949, 1956), is adopted. This technique assesses the stability of an estimator or index by sequentially removing one observation or component and recomputing the overall result. When applied to the ITPI, this procedure consists of excluding one indicator at a time (e.g., GDP per capita, unemployment rate, business creation) and recalculating the index value. The differences between the recalculated values and the initial index provide an assessment of the ITPI's sensitivity to each individual indicator.

The variations observed following the successive exclusion of indicators remain limited, thereby confirming the internal robustness of the ITPI and the absence of excessive dependence on any single component (table 3).

Overall, the adopted methodology is based on the construction of an Integrated Territorial Performance Index combining three pillars, economic efficiency, social cohesion, and perceived value, through a rigorous process of normalization, weighting, and geometric

aggregation. This approach provides a robust and multidimensional framework for analyzing the development trajectory of the Laâyoune–Sakia El Hamra region.

Table N° 3: Internal Robustness Test of the ITPI (Indicator Exclusion Effects)

Affected pillar	Excluded indicator	Recalculated ITPI (average 2014–2023)	Absolute variation	Relative variation (%)
<i>Economic Efficiency</i>	GDP per capita	0,51	-0,02	-3,8
<i>Social Cohesion</i>	Unemployment rate	0,50	-0,03	-5,6
<i>Perceived Value</i>	Business creation	0,52	-0,01	-1,9
	Value of investments	0,51	0,02	-3,6

Source: Own elaboration

The full set of sensitivity and robustness tests indicates that the ITPI remains stable under reasonable variations in construction assumptions. The observed differences remain limited, both in response to changes in weighting schemes and to the exclusion of individual indicators, thereby attesting to the methodological soundness of the index.

Three clarifications apply to the robustness protocol. With three pillars, the space of policy-meaningful weight vectors is narrow, so the analysis privileges the single most relevant deviation from the equal-weight baseline. The (1–2–1) scenario doubles the weight of the weakest and most debated pillar and thus acts as a stress test tilted against the region's favourable economic dynamics; the preserved trajectory under this configuration provides a demanding validation. Economically, the largest jackknife deviation arises when the unemployment rate is excluded, confirming social cohesion as the binding constraint of regional performance, while all other deviations remain limited: no single indicator mechanically drives the index.

3. Results

The presentation of the results is organized around three complementary components: the dynamics of the pillar-specific sub-indices, the evolution of the overall index, and the sensitivity and robustness tests assessing the stability of the findings. Taken together, these components provide a progressively refined reading of the endogenous drivers of territorial performance.

3.1. Evolution of Pillar-Specific Sub-Indices (2014–2023)

The analysis of the sub-indices makes it possible to assess separately the trajectory of each of the three pillars constituting the ITPI: economic efficiency, social cohesion, and perceived value.

Table N° 4: Normalized Pillar-Specific Sub-Indices for the Laâyoune–Sakia El Hamra Region (2014–2023)

Year	Economic Efficiency	Social Cohesion	Perceived Value
2014	0,42	0,38	0,31
2015	0,48	0,37	0,33
2016	0,55	0,36	0,35
2017	0,59	0,35	0,38
2018	0,63	0,34	0,40
2019	0,65	0,32	0,43
2020	0,66	0,28	0,46
2021	0,69	0,30	0,51
2022	0,72	0,31	0,56
2023	0,74	0,32	0,60

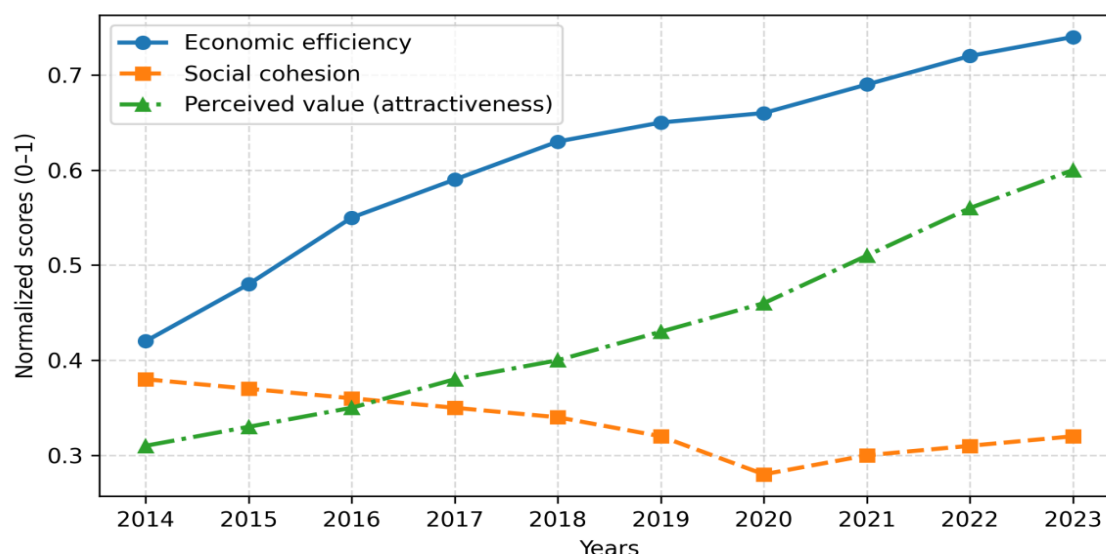
Source : Own elaboration

The table highlights a steady improvement in the economic efficiency pillar, reflecting the impact of public investment and the consolidation of the region's logistical base. In contrast, social cohesion remains structurally weak, with a marked downturn in 2020 associated with the health crisis. Perceived value shows a clear improvement after 2019, driven by increased entrepreneurial activity and the momentum of projects approved by the Regional Investment Center.

The figure below illustrates a continuous improvement in economic efficiency, reflecting the positive impact of investment dynamics and regional logistics. By contrast, social cohesion remains structurally weak, with a pronounced decline in 2020 attributable to the pandemic. Perceived value shows a marked improvement from 2019 onward, confirming the role of the Regional Investment Center in strengthening territorial attractiveness.

The comparison of the three sub-indices (figure 2) reveals a structural divergence, primarily characterized by the steady improvement of economic efficiency and perceived value, on the one hand, and the persistent weakness of social cohesion, on the other. This asymmetry suggests that the development of Laâyoune–Sakia El Hamra is driven by investment and productive infrastructure, but constrained by persistently high unemployment, which undermines the sustainability of the development model.

Figure N° 2: Evolution of Normalized Pillar-Specific Sub-Indices for the Laâyoune–Sakia El Hamra Region (2014–2023)



Source: Own elaboration

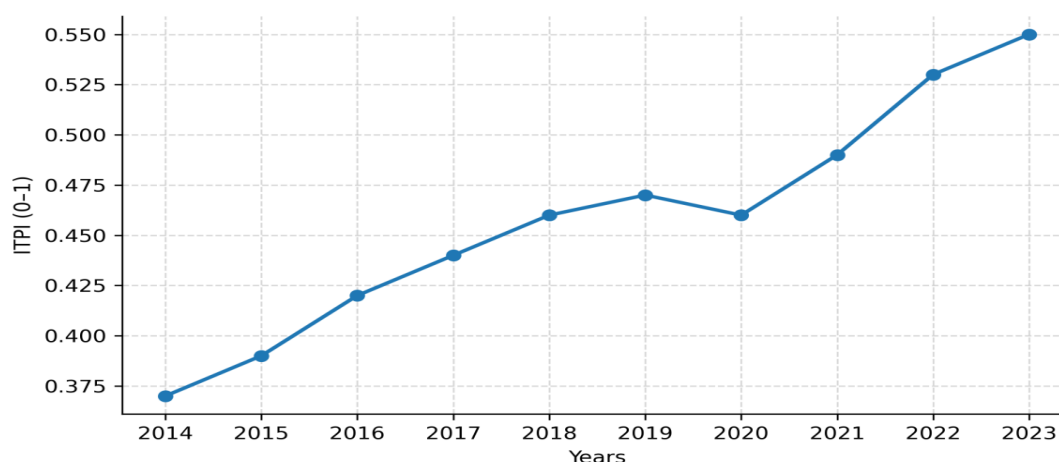
3.2. Trajectory of the Overall ITPI (2014–2023)

Following the analysis of the pillar-specific sub-indices, it is necessary to examine the overall trajectory of the ITPI. This composite index provides an aggregated assessment of regional performance by simultaneously accounting for economic efficiency, social cohesion, and perceived value, thereby capturing the integrated dynamics of the Laâyoune–Sakia El Hamra region over the period 2014–2023. The figure below illustrates the trajectory of this index for the region between 2014 and 2023.

The trajectory of the ITPI reveals a steady increase, rising from 0.37 in 2014 to 0.55 in 2023, indicating a substantial improvement in the integrated performance of the Laâyoune–Sakia El Hamra region. This positive dynamic is driven by the strengthening of regional GDP per capita, the growing role of logistical infrastructure, and the spillover effects of the Southern Provinces Development Plan launched in 2016 (figure 3).

The stagnation observed in 2020, associated with the pandemic, nevertheless confirms the vulnerability of the social pillar, which remains highly dependent on labor market conditions. The recovery from 2021 onward suggests a certain degree of regional resilience, supported by public investment and enhanced territorial attractiveness.

Figure N° 3: Trajectory of the ITPI for the Laâyoune–Sakia El Hamra Region (2014–2023)



Source: Own calculations based on data from HCP, Bank Al-Maghrib (BAM), National Ports Agency (ANP), OMPIC, and the Regional Investment Center (CRI).

However, the overall assessment shows that the upward trajectory of the ITPI continues to be constrained by the limited translation of wealth creation into employment, which represents a central challenge for the sustainability of the regional development model.

Moreover, the upward trend in the ITPI implies that Laâyoune–Sakia El Hamra has succeeded in consolidating its profile as a competitive and attractive region over the past decade. Nevertheless, the persistence of a fragile social pillar indicates that the sustainability of this performance will depend on the region's ability to convert investment into productive employment and to strengthen social inclusion, both of which are essential conditions for achieving balanced territorial growth. Finally, the observed trends remain broadly stable in light of the sensitivity and robustness tests presented in Section 3.4.

Taken together, the results indicate a gradual improvement in the territorial performance of the Laâyoune–Sakia El Hamra region over the period 2014–2023, as reflected by the upward trajectory of the ITPI. This dynamic is primarily driven by gains in **economic efficiency** and **perceived value**, highlighting the structuring role of public investment, productive infrastructure, and increasing territorial attractiveness. By contrast, **social cohesion** remains the most constraining dimension, with a weaker contribution to the overall index, thereby limiting convergence across pillars and pointing to persistent vulnerabilities in employment and socio-economic inclusion. Sensitivity and robustness tests confirm that this pattern is not driven by arbitrary methodological choices, but reflects structural features of the region's development trajectory. Overall, the results portray a territorial performance profile in

transition, characterized by sustained economic momentum that remains only partially aligned with social progress.

The asymmetry revealed by the ITPI — sustained economic and attractiveness gains alongside a structurally weak social pillar — mirrors the pattern documented for lagging European regions (Annoni and Dijkstra, 2019) and illustrates, at the infra-national level, the 'geography of discontent' (Rodríguez-Pose, 2018) typical of capital-intensive, resource-driven economies (Gelb, 2010), where growth carries limited employment content. For Morocco's advanced regionalization, the ITPI can serve as a steering tool for Regional Development Programmes and State-region contractualization: it shows that the binding constraint is not the volume of investment but its conversion into productive employment, while its non-compensatory design prevents social deficits from being masked by economic performance. Its transferability requires three conditions: available annual series (or functional substitutes, e.g. road or airport logistics for landlocked territories), normalization bounds adjusted to the relevant benchmark, and preservation of the three-pillar geometric architecture.

Conclusion

This study proposed an integrated approach to territorial performance through the construction of an Integrated Territorial Performance Index (ITPI) applied to the Laâyoune–Sakia El Hamra region over the period 2014–2023. By combining three complementary pillars, economic efficiency, social cohesion, and perceived value, the ITPI provides a multidimensional assessment of regional development that goes beyond traditional growth-based indicators.

The empirical results reveal a sustained improvement in integrated territorial performance, with the ITPI increasing from 0.37 in 2014 to 0.55 in 2023. This upward trajectory is primarily driven by gains in economic efficiency and territorial attractiveness, reflecting the combined effects of rising regional GDP per capita, logistics development, and the structuring role of the Southern Provinces Development Plan. The strengthening of perceived value, supported by entrepreneurial dynamics and the activity of the Regional Investment Center, further confirms the region's increasing attractiveness and competitiveness.

By contrast, social cohesion remains a binding constraint on the overall performance trajectory. Despite economic progress, persistently high unemployment—particularly among young people—limits the inclusive translation of growth and underscores the existence of structural vulnerabilities in the labor market. This asymmetry between economic and social

dynamics echoes the broader literature emphasizing that growth without inclusion may reinforce territorial disparities.

Sensitivity and robustness analyses confirm the methodological stability of the ITPI while highlighting its responsiveness to the social dimension. Variations in weighting schemes and indicator exclusion do not alter the overall trajectory of the index, thereby reinforcing the credibility of the empirical findings and validating the identification of economic efficiency and attractiveness as key drivers, alongside social cohesion as the main structural weakness.

Beyond its empirical contribution, this study offers a reproducible analytical framework for evaluating territorial performance in data-constrained, emerging regional contexts. While the analysis is subject to limitations related to data aggregation and the exclusion of certain dimensions such as innovation, governance, or human capital, these constraints open avenues for future research aimed at enriching the index and extending interregional comparisons. Overall, the ITPI constitutes a relevant tool for monitoring territorial dynamics and supporting more balanced policy strategies that reconcile efficiency, equity, and attractiveness in the context of advanced regionalization.

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