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COUPLING COORDINATION DEGREE ANALYSIS OF SPATIAL RESTRUCTURING AND REGIONAL DEVELOPMENT: AN INTEGRATED APPROACH TO MOROCCO'S ADVANCED REGIONALIZATION

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Abstract
This article analyses the relation between spatial restructuring and spatial development, in the context of progressing regionalization of concept relations 2017-2022 in Morocco. First, a coupling coordination degree (CCD) model develops two new compound indexes, or a regional development index (RDI) and a spatial restructuring index (SRI), whereby structural maximum rate of identity entropy weights are selected. Local spatial structure and spatial type of marriage, using the index of dispersion Clark and Evans (1954) in determining spatial development impact on the spatial type of marriage. Results reveal strong heterogeneity amongst the twelve regions or Morocco, again implying that spatial structure is an important factor in determining intensity coordination.
Development-structure consistency is higher in areas that are more aggregated and lower in dispersed areas with structural bottlenecks as space becomes congested. The study contributes to the literature by extending the application of CCD framework in Africa, integrating spatial structure analysis, and developing policy-relevant implications regarding territorial governance and regional convergence alternatives.

Keywords: Coupling coordination degree; Spatial restructuring; Regional development; Morocco; Advanced regionalization.
Classification JEL : R11, R12, R58, O18

1. Introduction

In a global context marked by intensifying urbanization processes, economic globalization, and administrative decentralization, understanding territorial dynamics constitutes a major scientific and political challenge (Medeiros, 2022). Contemporary spatial transformations are characterized by increasing complexity in the relationships between different territorial levels, generating new challenges in terms of planning, governance, and balanced development. Spatial restructuring, defined as a process of reorganizing territorial configurations under the influence of economic, social, political, and technological forces, interacts in complex ways with regional development processes, creating synergies or tensions that profoundly influence territorial evolution (Liu et al., 2017).

The study of these territorial dynamics generates particular scientific interest in the Moroccan context. Since the early 1990s, the country has initiated a process of major institutional reforms aimed at transforming its territorial governance model. The principle of "advanced regionalization" was established as the foundation of the kingdom's territorial reorganization by the 2011 Constitution, attributing to regions a crucial role in developing and implementing development policies. This institutional transformation is embedded within a gradual decentralization process that began with independence but intensified over the past two decades, culminating in the adoption of organic laws in 2015 that define the legal and operational framework for advanced regionalization.

Parallel to these institutional reforms, Morocco has experienced profound spatial transformations characterized by rapid urbanization (urbanization rate increased from 29% in 1960 to approximately 63% in 2022) and growing concentration of economic activities in a few metropolitan centers. Despite the scope of implemented reforms and considerable public investments, territorial disparities remain significant, with three regions (Casablanca-Settat, Rabat-Salé-Kénitra, and Tangier-Tétouan-Al Hoceima) concentrating nearly 60% of national wealth while representing only 44% of the total population.

This situation raises the central question of this paper: **To what extent is there coordination between spatial restructuring processes and regional development in Morocco, and how does it vary across space and time?**

This question is articulated around four sub-questions: How can we quantitatively measure the levels of spatial restructuring and regional development? What are the spatial and temporal patterns of coordination between these two dimensions over the 2017-2022 period? To what extent does pre-existing spatial structure influence this coordination? What implications do these results have for optimizing territorial policies?

To address these questions, this research pursues three main objectives: to develop an integrated methodological framework using composite indicators and the coupling coordination degree analysis model; to quantify and analyze coordination dynamics in Morocco's twelve regions over the 2017-2022 period; and to provide decision-support elements for optimizing territorial policies. The adopted approach emphasizes the combination of methodological innovation, rigorous empirical analysis, and operational relevance, aiming to contribute simultaneously to advancing theoretical knowledge and improving regional governance practices.

2. Literature review

2.1. Evolution of regional development paradigms and emergence of integrated approaches

The theoretical analysis of regional development has undergone significant evolution from neoclassical economic approaches toward integrated and multidimensional conceptual frameworks. These common top-down approaches are inadequate to account for persistent territorial differences. Today's paradigm currently promotes endogenous development, which develops certain resources known as the "signature" of territories that can support sustainable growth based on local specificities (Boutahar & Debbagh, 2023; O' Brien et al., 2015). This change is reflected in many policy changes and theoretical breakthrough, which focuses on the role of endowment characteristics in regional strategies.

In the meantime, new economic geography (Krugman, 1991) introduced a more nuanced approach in the recognition of agglomeration effects subsequently to the achievement of equilibrium between centripetal and centrifugal economic forces shaping the landscape of economic activity. However, the related economistic models have been progressively replaced by more articulated paradigms aware of the multi-dimensionality of the territorial development. In this regard, Medeiros (2022) proceeds with a new theoretical body, creating the Strategic-Based Regional Development (SBRD) and comprising six basic paradigms, which are: sustainable-based; institutional-based; knowledge-based; place-based; balanced based and infrastructural-based. Such development mirrors growing sensibility towards the fact that "territories affect regional development processes in all respects" (Halbert et 2014), and this, in favour of a systemic approach which allows accounting for dynamic interactions across economic, social, environmental, institutional and spatial territorial sub-systems.

2.2. Conceptualization and analysis methodologies of spatial restructuring

Alongside this theoretical trajectory, spatial restructuring has become a core concept in the analysis of contemporary territorial changes. As a mode of reconfiguring territorial structures in reaction to the changing internal and external facets of development systemic elements (Long

et al., 2017), spatial restructuring is approached through three dimensions: production restructuring, habitat restructuring, and ecological restructuring. Liu et al. (2017). "the reshuffling of socio-economic morphology and spatial patterns in reaction to shifts in factors". For emerging countries, Zhang et al. (2022) list a number of “emerging spatial restructuring regimes” which characterise variety in territorial transformation patterns across transition economies. Such regimes are defined by specific aggregations of capital, state intervention, demography and technology. The whole-system method established by Long and others (2017) suggests an encompassing framework that makes the distinction of morphological, functional and relational dimensions in spatial restructuring explicit while acknowledging complex interdependencies between individual territorial sub-systems.

2.3. Methodological innovation: Coupling Coordination Models

In view of the deficiencies of single-sector research methods, a major advancement in study of relations between complex systems is the Coupling Coordination Degree Analysis model. Originally used to study economy-environment relations, it has been continually improved and expanded into a means of analyzing the systemic interactions in territorial development (Li & Fang, 2014). Coupling represents the degree of interaction between systems, and coordination is about matching how two systems are developed together.

Mathematical formalization based on calculation the composite indicators of each system and its level of coupling as well as coordination. This enables the discrimination between high coupling but weak development and balanced coordination with sustained development, and makes it a strong technique for assessing synergy between coupled systems. There has been a proliferation of empirical applications in recent years; An et al. (2024) adopt it to examine the impact of digital finance on sustainable regional development with Zhou et al. (2025) are innovative to the extent that it applies this approach in institutional and legal terms. In particular, the research of Chengdu–Chongqing urban agglomeration has pointed out that with respect to the optimization of territorial space utilization, spatial spillover and regional development correlation are key issues (Zhang et al., 2024).

However, these applications are primarily focused on the Chinese scenario and the model need to be adjusted to other geographical contexts such as African and Middle East. This hiatus validates the use of CCD in Morocco to investigate the convergence between spatial reorganisation and regional development in another context with its own territorial dynamics.

2.4. Methods for constructing composite indices and structural spatial analysis

The construction of composite indices for regional development evaluation constitutes a recognized methodological approach for synthesizing complex multidimensional phenomena. Poledníková & Melecký (2017) emphasize that there is no uniform methodological approach and that composite indices represent one of the most appropriate techniques for aggregating multidimensional characteristics. The entropy method, based on Shannon's information theory principles, constitutes one of the most widely used objective weighting approaches, determining indicator weights based on their informational content and discriminating capacity (Karagiannis, 2020).

Complementarily, the Clark and Evans (1954) index provides a fundamental quantitative measure of territorial spatial organization. Based on comparing the observed average distance to the nearest neighbor with the theoretically expected distance under random distribution, this index generates a standardized measure of spatial structure. Its integration into territorial system analysis presents significant methodological advantages: objective measurement of spatial structure serving as a control variable, relative temporal stability making it a fundamental structure indicator that can moderate relationships between public policies and development outcomes.

2.5. Identified gaps and research contributions

This review reveals several important gaps in the current state of knowledge. First, the application of coupling coordination models remains largely concentrated on Chinese and developed contexts, with limited applications in African contexts. Second, despite abundant literature on regional disparities in Morocco, few studies adopt an integrated approach simultaneously analyzing spatial restructuring and regional development. Third, the absence of longitudinal analyses covering the recent period (2017-2022) limits the evaluation of the impact of advanced regionalization policies.

This paper aims to fill these gaps by developing an original application of the coupling coordination model to the Moroccan context, using recent data and integrating spatial structure analysis as a moderating variable. The proposed approach thus contributes to the geographical extension of coordination analysis methods and to enriching understanding of territorial dynamics in contexts of decentralization and advanced regionalization.

3. Methodology

This study aims to examine the dynamics of spatial restructuring in relation to regional development across Moroccan regions over the period 2017–2022. The primary goal is to construct and evaluate composite indices of regional development and spatial restructuring, assess their coordination through a Coupling Coordination Degree (CCD) model. The regions analyzed include all 12 official administrative regions of Morocco. The timeframe is selected based on data availability and recent territorial development efforts initiated by national policies.

To achieve it, the work can be defined by a structured method based on descriptive spatial analysis and indices construction and by a model of coordination. The first step consists in evaluating Moroccan regions' spatial structures applying a settlement dispersion index (DI). This measure represents the deviation from the distribution of all populated places (municipalities and subdivisions) that belong to one region. The information source for this index is the GeoNames geographical database, see The index is computed using spatial data on all populated places (feature class "P"). The data used to generate the index are from the GeoNames geographical database, which are prepared according to spatial information of all populated places (feature class "P"). The dispersion index adopted in this study is the Clark and Evans' index, which is a well-known method for quantitative description of how much point features are spatially clustered or dispersed. A DI value equal to 1 represents complete spatial randomness, values of 1 indicate regular or dispersed distribution (Clark & Evans, 1954). This index is a relatively static one, yet important for the sake of providing context in order to assess how preexisting spatial patterns might condition the effectiveness of spatial restructuring.

3.1. Data description

The empirical dataset consists of annual regional data from 2017 to 2022. The data is collected from official Moroccan sources, including the Haut-Commissariat au Plan (HCP), the Ministry of Agriculture, the Ministry of Health, and the Ministry of Education. The geospatial boundaries used for regional mapping are obtained from the GADM database. The database includes observations for 12 regions over 6 years. All variables have been harmonized to ensure consistency across years and regions.

Table 1: Description of variables

Category	Dimension	Indicator Layer	Description
RDI	Economic	GDP per capita (GDP_pc)	Income per capita, general indicator of regional economic prosperity.

		Agricultural GDP (Agri_GDP)	Value added from agriculture, reflects the importance of agriculture.
		Industrial GDP (Indus_GDP)	Value added from industry, contribution of industrial activity to the economy.
	Social	Population density (Pop_density)	Number of inhabitants per km², spatial concentration of population.
		Number of education centers (Edu_centers)	Proxy for access to education services and infrastructure.
		Number of hospital beds (Hospital_beds)	Proxy for healthcare infrastructure availability.
		Employment rate (Employment_rate)	Proportion of the working-age population currently employed.
	Environmental	Reforested area (Reforested_area)	Area reforested annually, indicates environmental restoration efforts.
		Total agricultural land (Agri_land_area)	Total area of agricultural land, reflects land use and ecological balance.
SRI	Spatial	New built-up area per year (Built_area)	Newly constructed urban area, indicator of spatial transformation and growth.
		Roads constructed (Built_ roads)	The evolution of the length of constructed roads, reflects the connectivity and spread of infrastructure.
		Primary healthcare centers (Primary_health_centers)	Number of local healthcare facilities, proxy for spatial service distribution.
		Agricultural land density (Agri_land_density)	Hectares of farmland per km², spatial structure of productive land.
DI	Spatial Structure	Settlement dispersion index (Settlement_dispersion)	Degree of dispersion of populated places, structural spatial configuration within the region.

The study constructs two composite indices:

- **Regional development index (RDI)**, comprising economic (e.g., GDP per capita), social (e.g., population density, education centers, employment rate), and environmental variables (e.g., reforested areas, agricultural land).
- **Spatial restructuring index (SRI)**, composed of dynamic spatial transformation variables such as new built-up area, length of new roads, healthcare facilities, and agricultural land density.

Each variable X_{it} is normalized using the **Min-Max method**:

$$X'_{it} = \frac{X_{it} - \min(X)}{\max(X) - \min(X)}$$

Where X'_{it} is the normalized value of variable X for region i at time t. The normalized values range from 0 to 1. After normalization, the composite indices (RDI and SRI) are calculated using equal weights:

$$RDI_{it} = \frac{1}{n}\sum_{j=1}^{n} X'_{jit} \quad \text{and} \quad SRI_{it} = \frac{1}{m}\sum_{k=1}^{m} X'_{kit}$$

Where n and m are the number of variables in the RDI and SRI respectively.

The Coupling Coordination Degree (CCD) is calculated to measure the interaction between RDI and SRI, based on the following formula:

$$D_i = 2 \times \frac{RDI_i \times SRI_i}{(RDI_i + SRI_i)^2}$$

$$\text{And} \quad T_i = \alpha RDI_i + \beta SRI_i (\text{with} \alpha = \beta = 0.5)$$

$$CCD_i = \sqrt{T_i \times D_i}$$

Where D_i represents the coupling degree between regional development and spatial restructuring, capturing the intensity of interaction between the two systems. $T_i$denotes the overall development level of the combined system, calculated as a weighted average of the Regional Development Index (RDI) and the Spatial Restructuring Index (SRI), with equal weights (i.e., $\alpha = \beta = 0.5$). Finally, CCD_i is the Coupling Coordination Degree (CCD), which synthesizes both the degree of interaction and the overall development level into a single measure. The value of C_i ranges from 0 to 1, where 0 indicates no coordination and 1 indicates perfect coordination between spatial restructuring and regional development.

3.2. Method for dispersion index

The dispersion index is calculated using data from GeoNames, which provides geographic coordinates for all populated places (feature class "P") in Morocco. These include cities, towns, and villages, enabling a comprehensive spatial analysis. The index is based on a simplified version of the Clark and Evans (1954) method, comparing the observed mean distance between each point and its nearest neighbor to the expected distance under a random distribution. The index is computed using the following equations:

$$r_{obs} = \frac{1}{N}\sum_{i=1}^{N} d_i \quad \text{(Mean observed nearest neighbor distance)}$$

$$r_{exp} = \frac{1}{2\sqrt{\lambda}} = \frac{1}{2\sqrt{N/A}} \quad \text{(Expected distance for random dispersion)}$$

$$DI = \frac{r_{obs}}{r_{exp}} \quad \text{(Dispersion Index)}$$

Where N is the number of points (settlements), A is the area of the region, and $\lambda = N/A$ is the point density. The resulting DI value indicates the degree of spatial regularity or clustering. This measure serves as a structural variable that remains largely stable over time and is used as a moderating variable, allowing the study to assess whether structural spatial form conditions the outcomes of spatial restructuring policies.

4. Results

2.1. Characterization of spatial structure

To begin the analysis, we assessed the spatial configuration of Moroccan regions using the Clark and Evans dispersion index. This index measures the degree to which populated places (cities, towns, and villages) are spatially distributed within each administrative region.

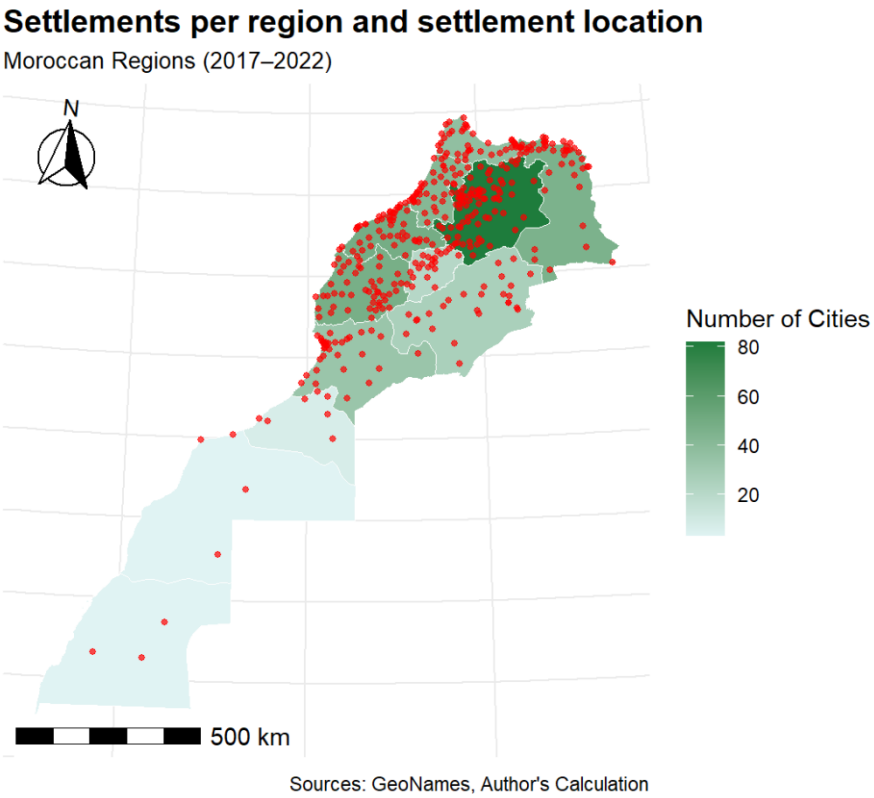

Figure 1: Settlements per region and settlement location

The results demonstrate notable heterogeneity across the 12 Moroccan regions. Laayoune - Sakia El Hamra displays the highest dispersion value, with a DI of 2.60, indicating an extremely dispersed spatial structure. It is followed by Guelmim - Oued Noun at 2.14, also classified as extreme dispersion. These high values reflect sparse settlement patterns, likely influenced by vast territorial extents, low population densities, and a concentration of infrastructure in a few urban nodes.

On the opposite end, regions such as The Oriental (1.44), Fez - Meknes (1.44), and Souss - Massa (1.44) show the lowest DI values in the dataset, falling into the moderate dispersion category. These regions exhibit more compact spatial patterns, where settlements are relatively closer and potentially better interconnected.

Regions like Tangier - Tetouan - Al Hoceima (1.59), Rabat - Sale - Kenitra (1.71), and Marrakesh - Safi (1.75) fall within the high dispersion range. These values suggest a hybrid spatial structure, characterized by concentrated urban centers surrounded by dispersed rural zones.

This diversity in spatial structure provides a critical foundation for the rest of the study. By identifying regions that are structurally compact versus those that are spatially dispersed, we gain insight into the constraints and opportunities each region may face when implementing spatial restructuring and development policies. The DI, being time-invariant, serves as a structural variable that contextualizes and potentially moderates the dynamic relationship between spatial transformation and regional development.

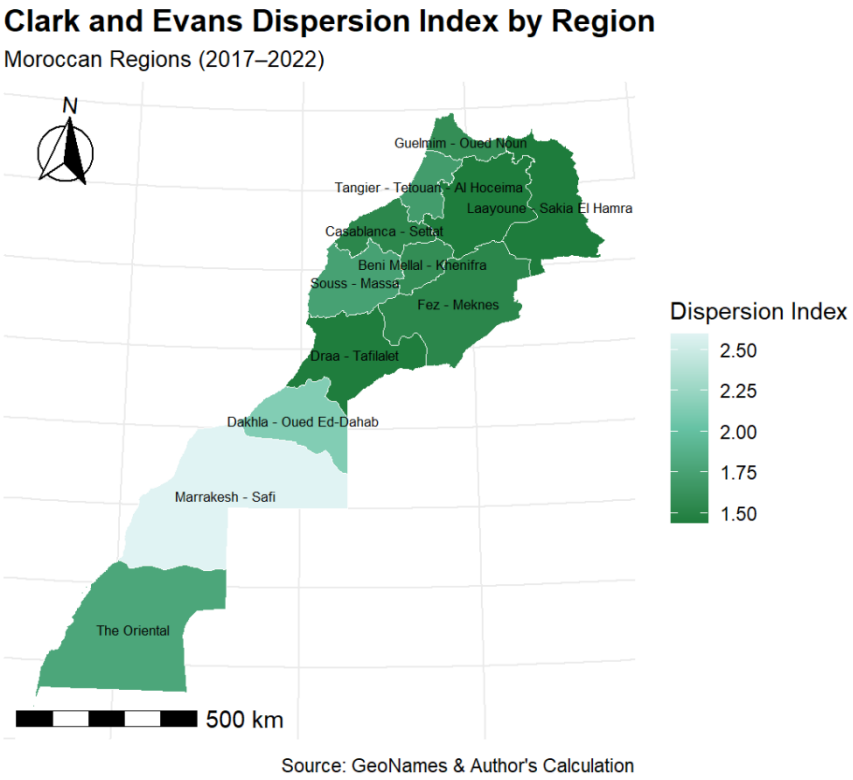

Figure 2: Clark and Evans Dispersion

2.2. Regional development index

The Regional Development Index (RDI) indicates considerable territorial disparities among the regions of Morocco during a 2017–2022 interval. Casablanca-Settat consistently emerges as the highest performer among the regions and its RDI values achieve a peak of 0.65 in 2022. This ultimately reflects the continuing status of the region as the leading economic center, largely due to its broad economic diversity and greater access to infrastructure and public services. Following this region is Rabat-Sale-Kenitra at 0.48, as an administrative and institutional location has indicated a moderate development dynamic direction, while remaining stable. Quite a bit further behind are the wilayas, or regions, of Fez-Meknes (0.30) demonstrating relatively strong ranking and Marrakesh-Safi (0.39). The RDI for these regions reflects that there are increments that are occurring although, these increments were small throughout the interval.

Beyond this, Beni Mellal-Khenifra also stands out with it's RDI achieving a substantial increase to 0.44 in 2022. This indicates that investment in infrastructure and services is beginning to translate into real growth.

In contrast, we computed the RDI scores for the additional regions: Tangier - Tetouan - Al Hoceima, Guelmim - Oued Noun and Draa - Tafilalet, and their RDI ranges between 0.18 and 0.30 (at moderate to low level of development). Finally, Laayoune - Sakia El Hamra, Dakhla - Oued Ed - Dahab and The Oriental are the tail of the RDI distribution, and in 2022 the Oriental recorded the least RDI (RDI = 0.11). This shows continuing discrimination in social outcomes for remote and sparsely populated communities.

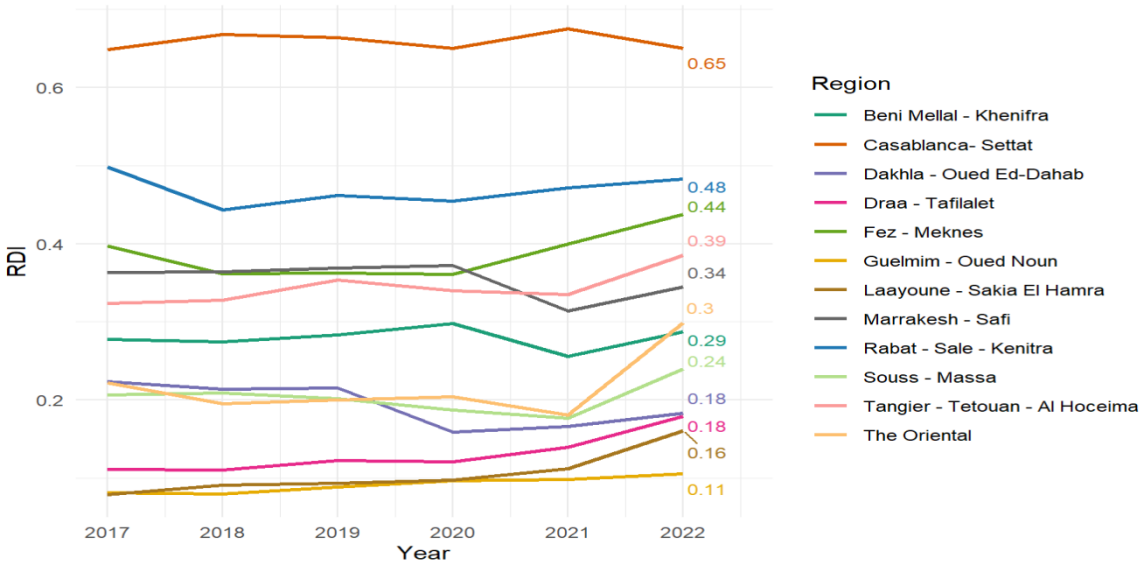

Figure 3: Regional Development Index Over Time

2.3. Spatial restructuring index

The Spatial Restructuring Index (SRI) assesses a region's performance in terms of "spatial repositioning" and "infrastructure reach and distribution of services." Again, Fez had the best SRI in 2022 (0.84). This is especially noteworthy, for it indicates a domestic high commitment by the region to the urban improvement of connections and public good facilities over the past 6 years. The region clearly committed capital to infrastructure during this time, which necessarily will have implications for the well-being of the urbanized population that it is positioned to serve.

The Souss-Massa (0.58) and Beni Mellal-Khenifra (0.33) registers higher readings in their SRI rankings as a measure of the readjustment to urban regional planning that then strengthened service recruitment ahead of time in increasing demands for roads and economic services and security of spatial equity.

Rabat-Sale-Kenitra (ranking 0.56) and Marrakesh-Safi (ranking 0.56) still occupy the upper mid-range of indications, representing slow, but stable changes of reorganization. It should be mentioned that one observation for Fez-Meknes, with is historic meaning and investment in socio-economic development, has the lowest (0.34) SRI suggesting the level of spatial re-organization is far behind the economic investment regime.

Another group of regions are appearing at a medium intensity: Tangier-Tetouan-Al Hoceima and Guelmin-Oued Noun with AMIs values of universal and hospitality they respectively enter lower-middle range, suggesting they have continuous work in progress, but marked attention to spatial and institutional hurdles possible remains.

At the bottom, The Oriental (0.04), Dakhla-Oued Ed-Dahab (0.06), and Laayoune-Sakia El Hamra (0.09) remain largely excluded from national spatial restructuring efforts. These regions exhibit minimal evolution in their spatial configuration, likely due to their remoteness, low population densities, or insufficient investment in spatial integration policies.

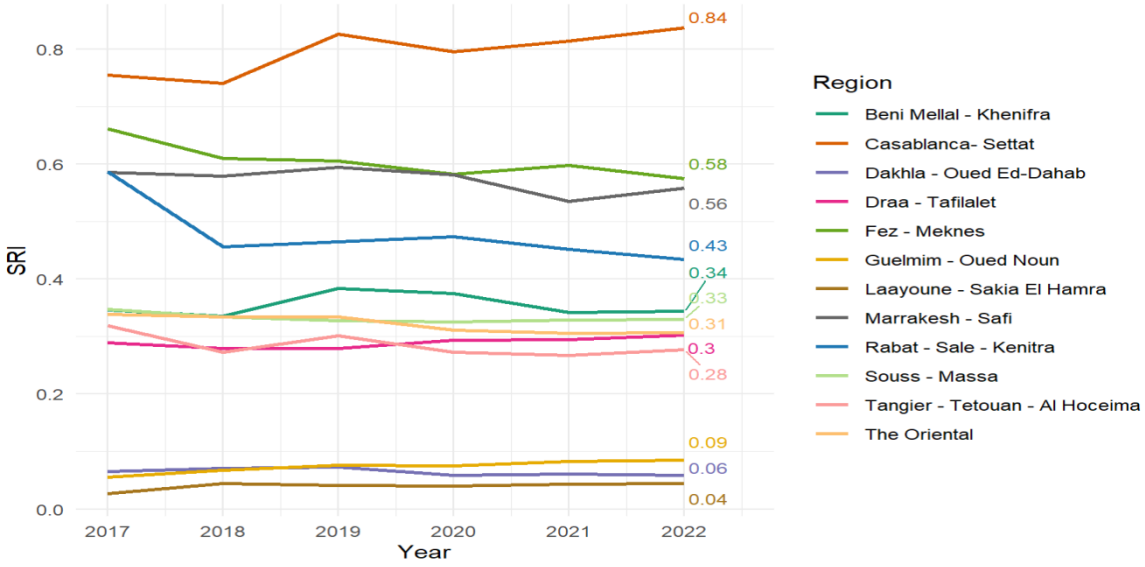

Figure 4: Spatial Restructuring Index Over Time

2.4. Coupling Coordination Degree

The Coupling Coordination Degree provides a quantitative framework to assess the alignment between regional development (RDI) and spatial restructuring (SRI). CCD values range from 0 to 1, where values near 1 indicate strong coordination between development and spatial transformation, and values closer to 0 reflect disconnection or imbalance. Generally, CCD values below 0.4 represent low coordination, values between 0.4 and 0.6 indicate moderate coordination, and values above 0.6 suggest strong coordination.

The results in table 2 reveal that during the six-year period under review, the region of Casablanca - Settat consistently records the highest CCD values, ranging from 0.59 to 0.61. This indicates a robust integration between economic performance and spatial planning. The region benefits from sustained infrastructure investment, high institutional capacity, and its strategic position as a national economic engine. Development and restructuring appear to advance in parallel, reflecting coherent policy implementation.

region	2017	2018	2019	2020	2021	2022
Beni Mellal - Khenifra	0,393	0,389	0,404	0,408	0,383	0,396
Casablanca- Settat	0,591	0,593	0,607	0,598	0,608	0,605
Dakhla - Oued Ed-Dahab	0,225	0,231	0,234	0,207	0,212	0,211
Draa - Tafilalet	0,284	0,281	0,292	0,292	0,308	0,335
Fez - Meknes	0,498	0,476	0,476	0,472	0,489	0,499
Guelmim - Oued Noun	0,181	0,191	0,202	0,206	0,212	0,217
Laayoune - Sakia El Hamra	0,143	0,173	0,169	0,168	0,177	0,187
Marrakesh - Safi	0,474	0,473	0,477	0,476	0,445	0,462
Rabat - Sale - Kenitra	0,519	0,474	0,481	0,482	0,48	0,478
Souss - Massa	0,36	0,358	0,353	0,345	0,339	0,373
Tangier - Tetouan - Al Hoceima	0,401	0,386	0,404	0,389	0,385	0,401
The Oriental	0,366	0,351	0,354	0,351	0,337	0,389

Table 2: Coupling Coordination Degree by Region and Year

Regions such as Rabat - Sale - Kenitra and Fez - Meknes follow with moderately high CCD values, mostly between 0.47 and 0.52. These figures reflect a relatively balanced relationship between growth and spatial changes. Their proximity to the capital and stronger administrative

coordination likely contribute to a more synchronized dynamic between service delivery, infrastructure, and economic development.

Marrakesh - Safi and Beni Mellal - Khenifra exhibit transitional patterns, with CCD values fluctuating between approximately 0.39 and 0.48. These intermediate results suggest partial coordination. Development gains may not be consistently accompanied by improvements in spatial infrastructure or land-use transformation. Internal disparities or fragmented planning processes may explain the observed variability.

Another cluster of regions around Tangier - Tetouan - Al Hoceima, Souss - Massa and The Oriental achieve CCD levels ranging from 0.34 to 0.40 in the same manner across all years. While these regions have been privileged with some investment projects (industrial platforms, port expansion etc.), the articulation between economic itineraries and spatial planning seems to be limited. Potential causes are disparities in service provision, reluctance to provide infrastructure facilities in hinterland areas, or lack of planning capacity.

The lowest levels of cumulative conditional development (CCD) were found in three southern regions during the years of study: Dakhla - Oued Ed-Dahab, Guelmim - Oued Noun and Laayoune - Sakia El Hamra (with levels below 0.25). These results suggest a high level of disconnection between developments intervention with spatial transformation processes. While national measures exist to reduce spatial disparities, the southern regions of Morocco remain structurally locked due to no density neighborhoods and transport isolation that are the result of administrative barriers. The potential for these southern regions to absorb public investment is likely to continue to inhibit progress to spatial restructuring.

Draa - Tafilalet present a case study in the evidence of change in the context, while placements are low it demonstrates consistent improvements of cumulative conditional development from 0.28 in 2017 to 0.335 by 2022. This suggests recently enhanced policy coherence and improved organizational coordinated towards regional development west of Marrakesh. Providing increased attention to housing development and coordination of plans can further secure the measures going forward.

On an interannual scale it can be seen that the majority of regions show relatively constant CCD values, with small variations. However, it should be noted that certain exceptions to this general rule have been observed. For instance, a brief decline in Souss-Massa was witnessed in 2020–2021, which some have attributed to administrative delays or brief disruptions caused by national shocks. The hypothesis that coordination levels primarily reflect long-term factors rather than sudden policy changes is supported by this temporal stability

The objective of this study is to ascertain which structural spatial properties are more likely to act as catalysts for coordination, given the persistent and enduring nature of such patterns over time. It is the contention of the DI that spatial reconfiguration and relative development variations may be significantly impacted by the spatial pattern of Moroccan regions. This structural indicative is in contrast with CCD and displays an apparent trend regarding this second measure that ultimately showcases that the spatial form must be acknowledged to influence the coordination dynamics of the regions.

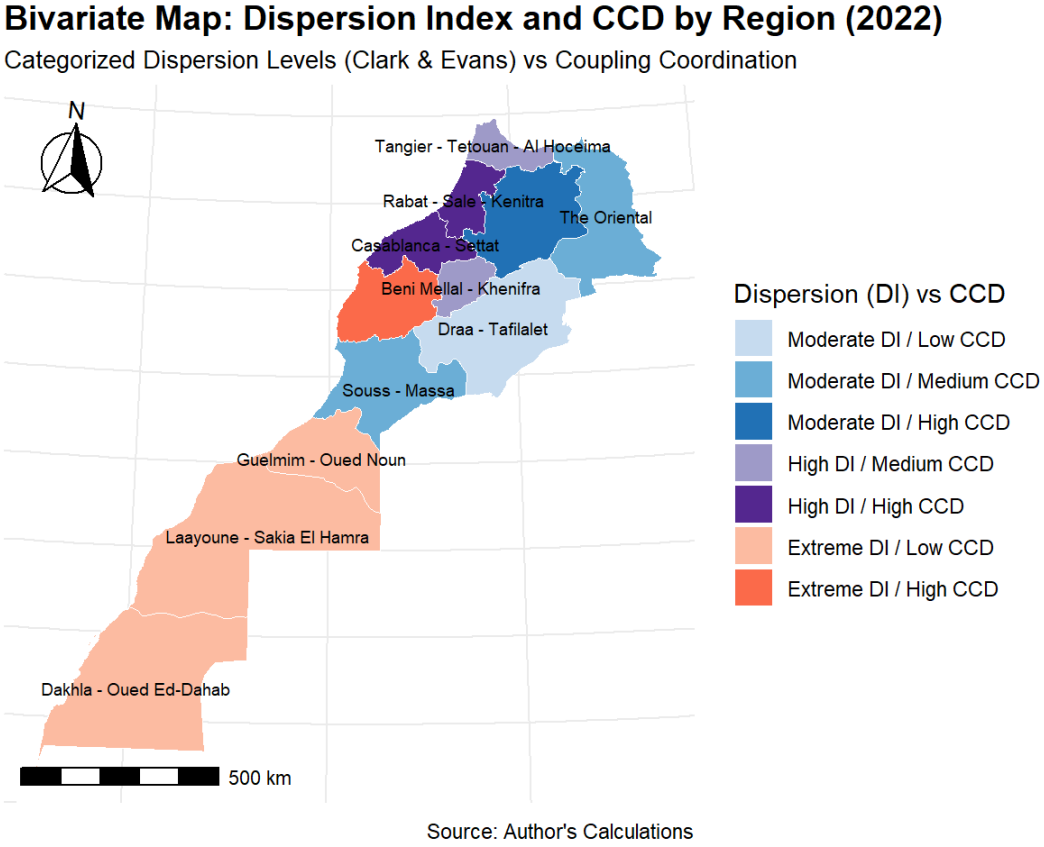

Figure 5: Dispersion Index and CCD by Region (2022)

In densely populated areas, the coordination dynamics are found to be more pronounced, with DI remaining low and settlements exhibiting a greater tendency to assort. Conversely, Casablanca-Settat's DI value of 1.53 has the highest CCD values during the 2017–2022 period, approaching 0.60. In a similar vein, the strong coordination levels of Fez-Meknes (DI = 1.44) and Rabat-Sale-Kenitra (DI = 1.71) are approximately 0.50. The findings indicate that the development and reorganization of space appear to be intertwined in scenarios where the spatial aggregation of people and services fosters effective public service delivery, infrastructure planning, and sound institutional governance.

In contrast, locations with maximum spatial dispersion face significant challenges in coordinating spatial transformation with development goals. The lowest recorded CCD score was for Laayoune - Sakia El Hamra, DI = 2.59, followed by Dakhla - Oued Ed-Dahab to 1.79 and then Guelmim - Oued Noun at a DI score of 2.14. The DI scores were all below 0.22 in 2022. Low DI scores in the score demonstrate the challenges moderate by being in a very large area with a very sparse population. In such instances the geography of physical distance, the absence of economies of scale, and large costly capital investments render coordination initiatives a lot less meaningful.

There are a number of intermediate states between these two extremes, in which the dispersion and coordination are somewhat balanced. Tangier \ Tetouan \ Al Hoceima (DI = 1.59) and Beni Mellal \ Khenifra regions have figures of the CCD close to the value of 0.40 which shows a rather balanced configuration shape, however other strategic policy coordination is highly required here. Marrakesh - Safi (DI of 1.75) displays steady CCD values around 0.46. This is a region with dense population, but also fragmented rural areas; as such, while spatial structuring may be favourable in part, its prospect of full co-ordination depends on the interventionism that will target it.

It is important to observe that regions such as Souss - Massa and The Oriental had fair to good DI values around 1.44 and minimum CCD values lower than 0.39 in the year 2012. These examples also demonstrate that for coordination to work in practice, as was meant in the spatial sense, a degree of spatial compactness is not a sufficiently indictive measure of success. The result is influenced heavily by factors such the quality of governance, capacity to plan and degree at which we invest in policies.

Draa - Tafilalet (DI = 1.53) offers an unprecedented instance of medium dispersion as a set-dlemt, in addition to lower commuting rates to other areas - over the 6 examined years it increased consistently, reaching .335 in 2022 in CCD. This indicates that the distribution structure affliction can be managed through appropriate ad hoc policies, relationships, and locational planning innovations.

This study posits that spatial dispersion – which is measured by the Dispersion Index, or DI – exerts a significant influence on regional coordination as a structural curve driver. In principle, the establishment of clusters has been demonstrated to enhance the efficacy of management, thereby facilitating more straightforward coordination and infrastructure-based spatial transformation. The correlation between governance and related effectiveness, on the other hand, exhibits a non-linear relationship with cluster size. The presence of both dense areas that demonstrate substandard performance and geographically dispersed areas that exhibit superior performance can be attributed to the efficacy of governance. The results of this study demonstrate the importance of a coordinated approach to spatial density, both in terms of institutional policy-based fixes and in relation to spatial planning. This coordinated approach is shown to be effective in the context of remaking developmental policy.

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