

## ***Territorial dynamics in Tunisia: Do incentives allow convergence?***

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### ***Abstract***

The basic goal of this paper is to review the role of the incentives granted for regional development in the territorial dynamics in Tunisia. In the 1960s, Tunisia opted for a planned economy model based largely on the State's intervention. It opted for the model developed by *François Perroux* « *development hub model or model of Centre/Periphery* ». The State has created centres in each economic region, a region is defined as a homogeneous geographical space: 6 poles have been created, some of which are present until today. These poles will then have to radiate over the rest of the space of each region.

With the stop or even «*failure*» of the socialist model in 1969, the State sought the help, at the beginning, by encouraging the local private sector to invest, then in 1972, and in the absence of local investors initially non-existent or weakened by the adoption of the cooperative system, Tunisia went to ask for the foreign investors who have responded quickly and are largely present today. The assistance of the private sector to the efforts of the State was directed to particular sectors or activities and for particular regions or territories. Therefore, the Tunisian Government, in accordance with the economic model adopted, continued to encourage the private sector to invest and create projects to contribute to regional development: Sectoral investment codes for the years of 1981, 1982, 1985, 1986, 1987, 1989, 1993 and 2016 and the creation of regional development offices, etc.

The question that arises is to see to what extent, incentives that cost the Tunisian State on average 2% of the GDP per year, contribute to the territorial dynamics in Tunisia? In other words, is it permissible to say that the incentives allow for the construction of territories or are the incentives channels for moving from a given territory to a built territory.

***Keywords:*** Territorial dynamics, incentives, poverty, Moran index, GWR.

***JEL classification :*** H5- R1- R58

### **I. Theoretical positioning: Convergence vs Catching up**

The territorial dynamics discussed in this paper are based on the theory of exchange and the positioning of the region. The geographic positioning of the region is often discussed by some current as an exogenous variable and by others as an endogenous variable. Born of an application to the regional economy of international trade new theories, the New Geographical Economy (NGE) considers that the region is an exogenous variable to explain the national development from the mid-1990s onwards, the work was mainly carried out by P. Krugman (1979, 1991, 1993, 1998) and Myrdal (1957).

#### **1. Territorial dynamics and the NEG**

By dealing with how economic activities are located in space, Paul Krugman (1979) helped to create the New Economic Geography (NEG). Paul Krugman (1979) focuses on two major issues. The first concerns the reasons why economic activity is concentrated in a limited number of regions and/or cities. The second, which is complementary, concerns the reasons why certain particular economic activities, such as carpet manufacturing or scientific research for example, are concentrated in some places.

Paul Krugman (1991) shows that the initial conditions of agglomeration are sometimes decisive in explaining the concentration of economic activity as transport costs are reduced. Industries locate in a place taking into account the trade-off between economies of scale, which favor concentration, and transport costs, which favour dispersion. Each industry then tries to serve its market by minimizing transport costs, i.e. by getting closer to local demand. This leads to a circular process: industries look for locations where local demand is strong while local demand is all the stronger because many industries have chosen this location.

Some minor comparative advantages lead to major differences in the development of the various urban centres.

To explain geographic clusters Krugman (1998) stresses the importance of a labour market and specialized suppliers. These market-size advantages are reinforced in some places by technological or informational externalities linked to the importance of proximity in the transmission of knowledge and knowledge.

## **2. Territorial dynamics and convergence**

This approach developed with the work of classical economists (Ricardo, HOS, Solow). According to this approach, the region is an endogenous variable, a variable to explain: Why are such territories developed when others are not? Some economists saw that the opening of territories to trade allows the gain for all territories (Ricardo, A. Smith), others (H.O.S) have factorial endowments and natural resources that determine the development of territories, for others, which are part of the neoclassical approach to growth (R. Solow), long-term convergence is ensured in a context of free trade.

Our investigation is situated in this context, we will seek to study the impact of public policies in the territorial dynamics and this in parallel with the natural and factorial endowments of the same regions. Regional dynamics will be measured by the capacity of Tunisian regions to fight poverty.

Economic convergence is one of the most important macroeconomic theories. It is considered a derivative of the neoclassical growth models of Ramsey (1929), Cass (1965), Koopmans (1965) and Solow (1956). It is strengthened not only by the mobility of capital and new technologies from rich (advanced) countries to poor (lagging) countries but also by the mobility of labour from poor to advanced countries (Barro and Sala-I-Martin, 1990).

The convergence hypothesis developed by neoclassical models *"predicts a convergence of countries towards the same level of GDP per capita, under the hypothesis of decreasing returns to capital and of a space where countries are similar in terms of preferences and technologies"* (Kibala Kuma, 2020). Under this approach, it is almost automatic. Then, the second generation of economists supporting the neoclassical approach *"sought to provide a better theoretical basis for the convergence process by omitting, however, the technological and socio-institutional aspects underlying them."* On the other hand, the one developed by endogenous models is based on the idea that the process of convergence is achieved not only by decreasing returns on capital but also by the transfer of technology and knowledge (Howitt, 2000). In addition, the impact of this transfer on the process of economic convergence is mainly conditioned by the particular characteristics of each lagging country (Martin and Sunley, 1999). In other words, countries lagging behind must have a certain threshold of absorption capacity in order to be able not only to assimilate and exploit new technologies developed elsewhere but also to benefit from the knowledge externalities of advanced countries. So, they will be able to catch them.

For Diop (2002) *“The concept of convergence is used in economic analysis to characterize the process of bringing countries closer together with regard to certain macroeconomic variables such as per capita GDP”*.

So, the convergence process occurs when the country approaches a certain threshold (state of equilibrium) or when there is a decrease in the difference between two values over time. This concept aims to explain the differences in terms of real income levels per capita (Dvorokova, 2014). “The concept of convergence was originally used to describe the process by which poorer economies are expected to catch up with those enjoying a higher level of per capita income. It was accepted that the growth rates recorded in the developing countries should be, over the long term, higher than those of the economically more advanced countries, which would allow a reduction of the gap between the levels of development of these two groups of countries” (Diop, 2002). Thus, the convergence hypothesis is that poor countries will grow faster than rich countries (Barro and Sala I Martin, 1991; Mankiw et al, 1992; Le Pen, 1997 and Dowrick and Nguyen, 1989). Islam (2003) presented several concepts of convergence: unconditional or absolute convergence versus conditional convergence with its 2 models: the endogenous model of human capital and the endogenous model of innovation. Countries that have these new factors will grow faster than advanced countries. The process of convergence is therefore conditioned by all these factors.

## **II. Highlighting territorial imbalance and the need for convergence**

### **1. General finding: RDI as criterion for measuring territorial dynamics**

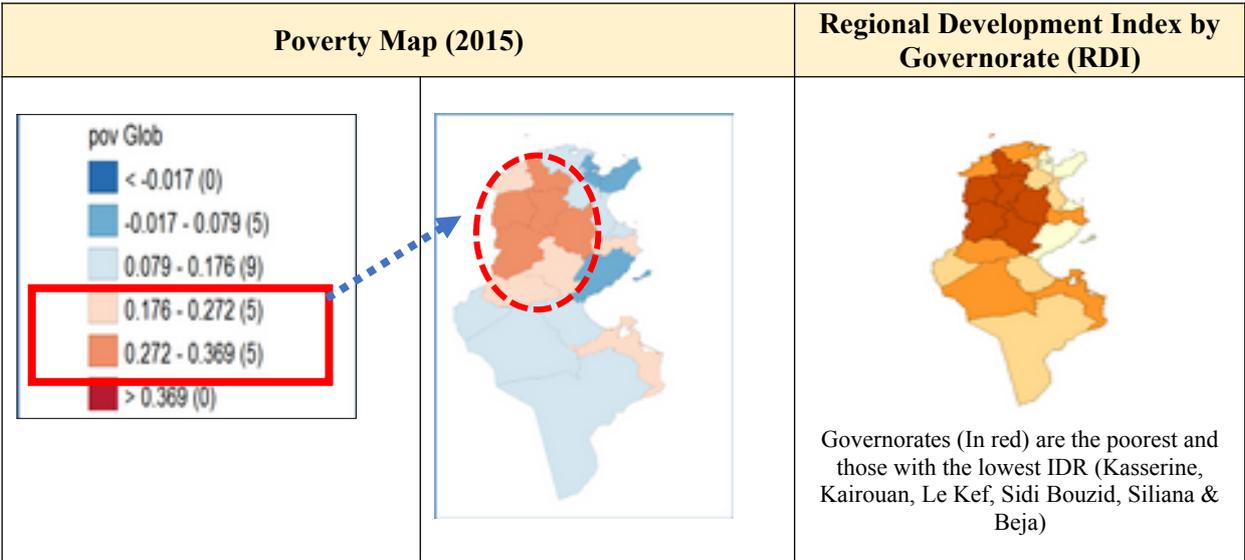
The objective at this level is not to review in fine the specificities and intrinsic characteristics of the different regions and the indicators selected for the analyses – work canvassed at length and in depth on many occasions (See work IACE, ITCEQ, MDCI, etc.) – but rather to highlight the problem of territorial imbalance and the need for territorial convergence. Thus, as elsewhere in the world, the improvement of living standards has often been accompanied in Tunisia by an increasing spatial polarization and even the worsening of certain gaps. These inequalities are the result of a natural situation, a legacy accumulated over the years and socio-economic choices made.

Thus, we are witnessing:

- The centralization and concentration around Tunis and its relays: The overwhelming weight of Tunis is only the expression of the centrality of the State, it blocks the emergence of the region and the development of regional metropolises.
- The unequal distribution of the population: The population is unevenly distributed between the regions since the littoral zones concentrate the majority of the population, especially urban.
- Fertility and mortality: rapid but nuanced decline by region
- Imbalanced connectivity and urbanization
- Inappropriate living conditions in inner regions.

In the absence of purely economic data (GDP by region, Consumption by region, etc.), the territorial dynamics are to be studied through poverty levels; the study of the territorial dynamics in Tunisia shows, regardless of the criterion chosen, that the Tunisian regions have not moved in the same direction; The maps below show this divergence in regional development. Poverty Seville in the regions of Kasserine, Sidi Bouzid, Seliana, Kef, Beja, Kairouan, these same regions have the lowest RDI. The RDI being a composite index of 27

indicators reflecting the living conditions, the social and economic environment as well as<sup>1</sup> the labour market situation in each of the 24 regions of Tunisia.



Source: Authors' compilation

**2. Looking for a new territorial configuration: MORAN index**

The territorial dynamics and the delimitation of the spatial clusters will be revisited at this level of the study: It will be an analysis in terms of spatial correlation using the "I" statistic of Moran (Moran (1948), Cliff and Ord (1973), Anselin (1988), Bouzidi (2020)) and the Local Indicators of Spatial Association (LISA) to demonstrate Local spatial autocorrelation and territorial dynamics. Moran and LISA statistics are to be applied to the observed poverty rate variable by governorate in 2015.

Moran's global and univariate I statistic is as follows:

$$I = \frac{\sum_i \sum_j W_{ij} Z_i * Z_j / S_0}{\sum_i Z_i^2 / n}$$

Where,  $W_{ij}$  describes the elements of the spatial weights matrix and  $S_0 = \sum_i \sum_j W_{ij}$  as the number of observations and the sum of all weights.  $I$  is Moran's statistic, it varies between -1 and +1.

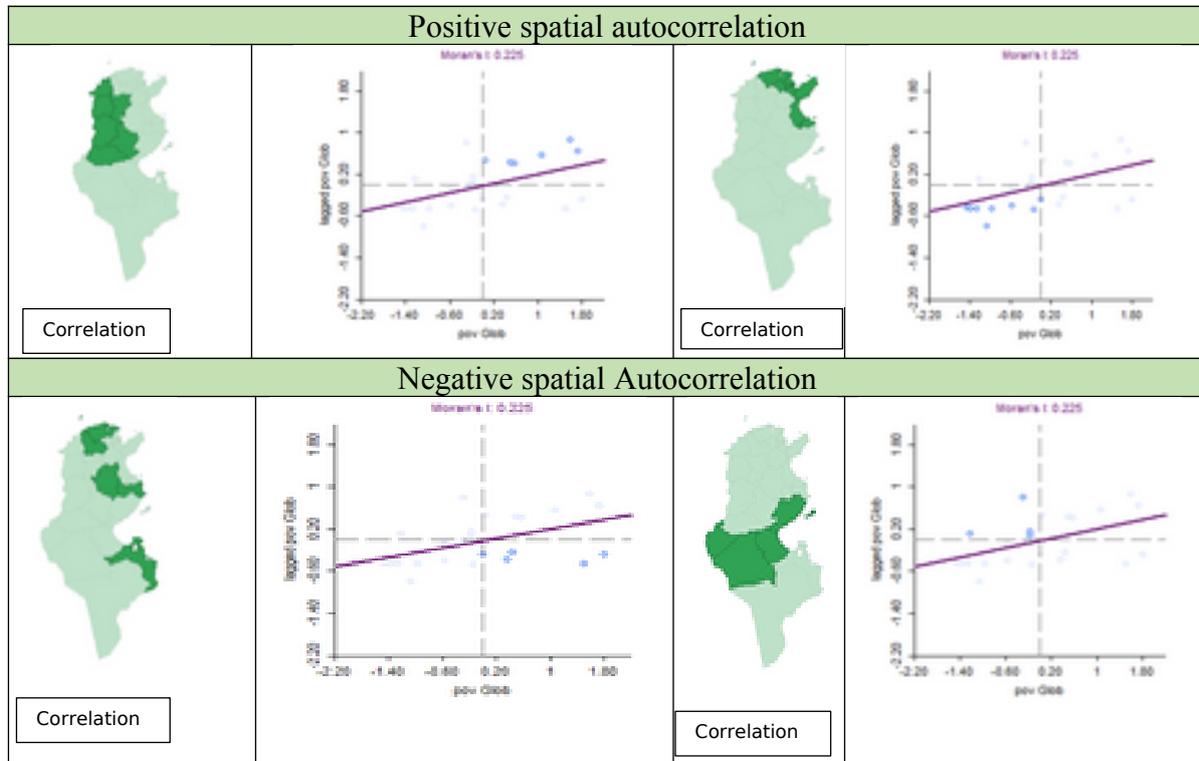
A positive "I" score indicates spatial clustering of high or low values, while a score close to zero implies no spatial autocorrelation. A checkerboard pattern of different values results in a Moran's I close to -1.

The application of the I of Moran allowed us to redefine the cartography of the territories of Tunisia, it makes it possible to detect the territories, which resemble each other.

<sup>1</sup> IDR = Composite Index (27 indicators).  
 IDR = 0.33\* living conditions (9 indicators) + 0.21\*social environment (6 indicators) + 0.24 KH (3 indicators) + 0.22\*Environment & labour market (9 indicators)

According to Moran's diagram, we distinguish 4 quadrants: Poor territories entered by others also poor (LL), rich territories surrounded by others also rich (HH), rich territories surrounded by other poor people (HL) and Poor territories surrounded by riches (LH).

It is described in the following figure:



Source : Bouzidi (2020)

### III. Territorial dynamics and public policies: Incentives

Tunisian public policies for territorial development are rooted in the history of independent Tunisia. Various measures have been taken since the 1960s, they concern the mode of governance of regional development, the development of specific programs and through a policy of incentives for regional development.

Wishing to ensure the "catching up" of marginalized or undeveloped territories, the Tunisian authorities have worked since the end of economy socialization experiment in 1969 to develop certain regions classified as "regions in development or to be developed" via a arsenal fiscal and financial incentives.

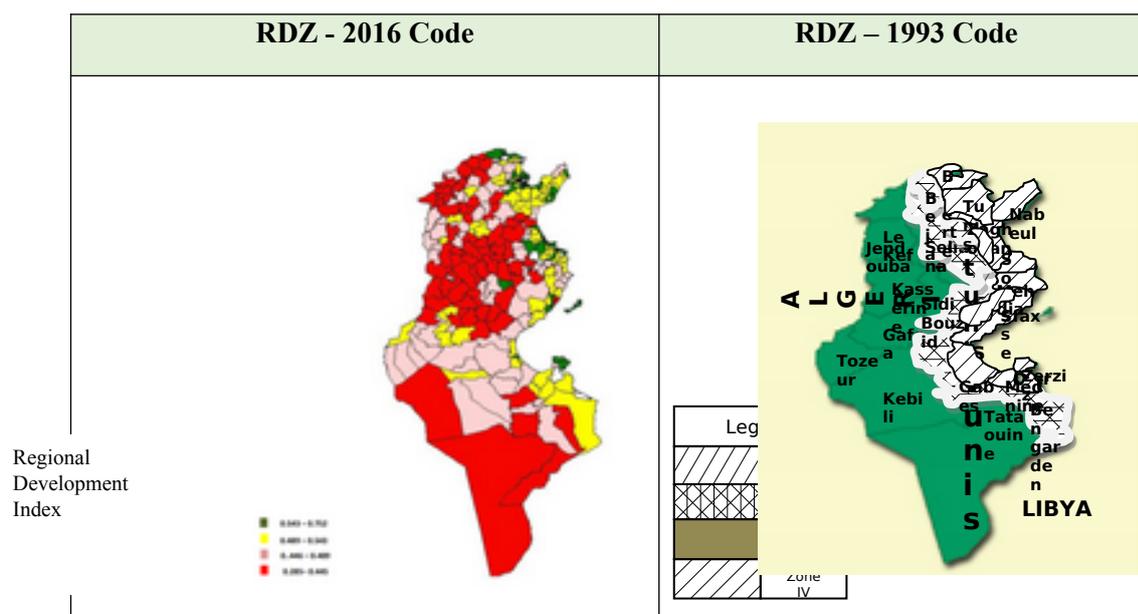
The delimitation of the territories subject to the investment incentive in Tunisia dates back to 1968 when the State established an investment incentive zone called, at the time, the "Tunisian South".

Since then, with the promulgation of the first investment incentive code in 1968, we have begun to see a series of measures in favour of territorial areas eligible for benefits granted under industrial decentralization. Furthermore, the notion of Regional Development Zone (RDZ) was introduced explicitly in 1994 following the promulgation of the investment incentive code in December 1993, the latter was repealed by another text of law acting as of Investment Charter: Law 71-2016.

There are 5 attempts to zoning the territory:

- 1974 code (1977-1979 division): Governorate is the core of the territorial division.
- 1981 code: Delegation is the core of territorial division.
- 1987 code: Division based on a mix of chief towns of governorates and delegations.
- 1994 code: Emergence of Regional Development Zones (RDZ)
- 2016 code: Delimitation based on the RDI

Incentive measures for regional development were assigned each time in accordance with a division that is sometimes geographical, vertical, and this is the case of the 1993 Code; sometimes economic, mosaic, and this is the case of the 2016 Code. The maps below show this division.



Source: Our compilation based on 1993 and 2016 Codes

#### IV. Incentives and Territorial Dynamics: Spatial Empirical Analysis

##### 1. Definition and delimitation of variables

At this level, it is a question of seeing the impact of incentives in controlling poverty. Poverty being a multidimensional variable, it integrates both socio-demographic factors and HDIs. We collected 83 indicators that we compiled into 9 areas (Bouzidi (2020)).

Aware of the large number of variables (83), we first sought to reduce this number without losing information; the appropriate method that has been used is through a PCA analysis. The latter allowed us to reduce the number of indicators from 83 to 53; an analysis of stationarity and potential multicollinearity issues was applied to these 53 variables.

Table 1- Sizes before and after PCA

Domain		KMO Index	Level of explained variance	Number of indicators	
				Before PCA	Before PCA
D1	Infrastructure and urbanization	0.589	81,64	12	5
D2	Health	0.700	86,01	10	8
D3	Education	0.765	80,17	11	5
D4	Adoption of ICT	0.802	93,36	9	7
D5	Financial inclusion	0.631	80,59	12	8
D6	labor market	0.687	86,62	18	12
D7	Population characteristics	0.636	79,83	9	6
D8	Income inequality	1	100	1	1
D9	Public Policy (Incentives)	1	100	1	1

<b>Total</b>	-----	-----	<b>83</b>	<b>53</b>
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Source: Output of SPSS 25.0

The variables retained after having analyzed the stationarity of the variables and removing the problem of collinearity are described in table 2.

*Table 2- Independent variables retained for estimation*

<b>Domain</b>	<b>Independent variables</b>	<b>Endogenous variable</b>
D1	Urbanization rate	Global Poverty
D2	Mortality rate	
	Number of hospital beds	
D3	Higher enrollment rate	
D4	Internet service availability rate	
D5	Number of exporting companies	
	Number of microfinance institutions	
D6	Number of unemployed in thousands	
	Working population employed in the service sector including trade	
	Working population employed in the building and public works sector	
D7	Distribution of households by size - 7 members	
D8	Gini index	
D9	Incentives	

## 2. Estimation

Based on the idea that traditional global models will mask potential spatial heterogeneity and spatial non-stationarity in the determinants of the prevalence of poverty (Brunsdon and al. (1998), Apparicio et al. (2007), Ogneva-Himmelberger and al (2009), Matthews and Yang (2009, 2012), Benson and al (2005)), we will choose to estimate a GWR model. The GWR provides a method for assessing the extent to which the relationship between potential determinants and the prevalence of poverty varies across space. It is a local spatial regression technique, which belongs to the category of models with variable coefficients. It offers a local model of the variables with varying regression coefficients by fitting a regression equation to each feature in the dataset.

The GWR method allows the creation of separate equations by inserting the endogenous and exogenous variables of the features contained within the bandwidth of each target feature. The shape and size of the bandwidth is dependent on the kernel type value entered by the user for the Bandwidth Method, Distance, and Number of Neighbours settings.

In simple or multiple linear regression, the  $\beta_k$  coefficients are considered unique and identical over the entire study map. However, this assumption of spatial uniformity of the impact of the independent variables on the dependent variable is very often unrealistic (Brunsdon et al. (1996)), since it will obscure the geographical specificities and the spatial variability of the phenomenon under study. Thus, the regression coefficients of the parameters vary significantly across space. They build continuous surfaces that are estimated at certain points in space based on the geographic coordinates of the observations.

$$Y_i = \beta_0(u_i, v_i) + \sum_k^p \beta_k(u_i, v_i) x_{ik} + \varepsilon_i$$

With  $(u_i, v_i)$  the geographic coordinates, Latitude and Longitude of each governorate.

The fact of being able to very precisely determine a place in this way is of extreme practical efficiency, in the sense that instead of defining a place by a graphic or textual

description that is cumbersome and can be ambiguous, it is only indicated with a short sequence of numbers. The matrix of geographical coordinates carries the weight of each observation according to its distance from the point "i" of coordinates  $(u_i, v_i)$ . The estimation of this model (GWR) is based on an assumption stipulating that the closer the observations are in space  $(u_i, v_i)$ , the closer the influence of the exogenous variables on the endogenous variable, and consequently the coefficients of the explanatory parameters of the regression will be close. We will thus have, using the (GWR) model, to regress an equation of the form:

$$Y = \mathbb{X} \otimes X + \varepsilon$$

Where:

- Y: Vector (n × 1) of dependent variable.
- X: Matrix (n × (p + 1)) of p independent variables + constant.
- 1: Vector (p + 1) × 1 of 1.

The β coefficients of the model in matrix form:

$$\begin{pmatrix} \beta_0(u_1, v_1) & \dots & \beta_0(u_1, v_1) \\ \beta_0(u_j, v_j) & \dots & \beta_0(u_j, v_j) \\ \beta_0(u_n, v_n) & \dots & \beta_0(u_n, v_n) \end{pmatrix}$$

The alphanumeric symbol  $\otimes$  multiplies each component of the matrix of coefficients (β) by the corresponding element of the matrix X of the particularities of the observations. The estimation results are shown in the table below.

*Table 3- GWR Model estimation results*

Domain	Independent variables	Est.	t(Est/SE)
	Constant	0,000	0,000
D1	Urbanization rate	1,57	4,80
D2	Mortality rate	-0,12	-0,64
	Number of hospital beds	0,38	2,71
D3	Higher enrollment rate	0,31	3,73
D4	Internet service availability rate	-0,32	-2,20
D5	Number of exporting companies	-0,42	-1,03
	Number of microfinance institutions	1,39	8,32
D6	Number of unemployed in thousands	0,74	3,43
	Working population employed in the service sector	-0,47	-2,07
	Working population employed in the building and public works sector	0,56	2,10
D7	Distribution of households by size - 7 members	0,23	2,36
D8	Gini Index	-1,02	-8,07
<b>D9</b>	<b>Incentives</b>	<b>0,315</b>	<b>0,45</b>

**Conclusion and recommendations**

Incentives seem insignificant in the territorial dynamics, as long as they are insignificant then why do the authorities continue to grant incentives? In fact, in many studies (Ghazouani (2010, 2011)) it has been shown that incentives - regardless of the objective (Export Promotion, Regional Development, environmental protection, job creation, etc.) - did not achieve the expected results in terms of investment promotion and job creation.

Studies have revealed that the promotion of investments and the development of a territorial dynamic goes through the improvement of the business climate or even the business environment while releasing the potential of economic actors; Consequently, the incentives can be described as a price to be paid by the authorities to buy the silence of entrepreneurs, to

call for investment in the RDZs in the face of their shortcomings in terms of good governance and the business climate.

So, what's left to do? After redefining incentives at the top, seeking to create territorial catch-up via incentives is a mission that has demonstrated its limits over more than 50 years. Seeking to empower the territories after having clearly defined them outside the Zoning mentioned above seems to be an avenue to explore further, especially since certain international experiences have shown the importance of decentralization and effective empowerment (Chettab N & Al. (2021)), nevertheless decentralization is a process that will take quite a long time! in the meantime, the Central Power is called upon to put into practice the principle of positive discrimination, a principle constitutionalized since 2014 but not implemented.

The application of this principle requires the redefinition of the territories object of positive discrimination, one can think of retaining the division developed on the basis of “T” of Moran exposed above.

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