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Spatial analysis of the local governance barometer -Empirical study of on a sample of the municipalities of El bayadh by analysis data spatial-

التحليل المكاني لمقياس الحكم المحلي الرشيد

– دراسة تجريبية لعينة من بلديات البيض من خلال تحليل البيانات المكانية–

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Abstract :

This study aimed mainly to classify public's perceptions about local governance through the dimensions of good governance on a sample of the municipalities of El bayadh, And also its analysis in terms of their spatial distribution. Data relied on from the results of the Local Governance Barometer and then analyzed it using spatial analysis by the Average Nearest Neighbor and the Spatial Autocorrelation Coefficient (Moran's Index) across GIS.
The results suggest that there are divergences and differences between municipalities (22) through good local governance index, that their distribution pattern is dispersed and random, and that there is no spatial autocorrelation.
Keywords: Local Governance Barometer, spatial analysis, Nearest Neighbor, Moran's Index.

ملخص :

هدفت هذه الدراسة بشكل رئيسي إلى تصنيف تصورات المواطنين حول الحكم المحلي عبر أبعاد الحكم الرشيد على عينة من بلديات ولاية البيض، وكذا تحليلها من حيث توزيعها المكاني تم الاعتماد على البيانات من نتائج مقياس الحكم المحلي ثم تحليلها باستخدام التحليل المكاني من خلال صلة الجار الاقرب ومعامل الارتباط الذاتي (مؤشر موران) عبر تقنية نظم المعلومات الجغرافية.
بحيث تشير النتائج إلى وجود فروقات واختلافات بين البلديات (22 بلدية) من خلال مؤشر الحكم المحلي الرشيد، ونمط توزيعها كان متباعد وعشوائي وعدم وجود ارتباط ذاتي مكاني بينها.
الكلمات المفتاحية: مقياس الحكم المحلي، التحليل المكاني، الجار الاقرب، مؤشر موران.

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INTRODUCTION :

The concept of good governance is one of the concepts that has spread recently among the scientific community and local and international organizations. It is an effective tool in confrontation the challenges facing the state and society through the actual partnership between the state, the private sector and civil society. Where good local governance is one of the solutions that contribute to good practices in the management of public affairs and Implement rules and procedures, which enables citizens to express their interests, exercise their rights and participate in the development process as the main pillar in achieving development goals at the local level.

The local governance barometer came across its different dimensions to present citizens ' views and perceptions about local government. Our study highlights one of the modern methods of statistically addressing phenomenon, namely spatial analysis through which it is possible to study the location of citizens' perceptions of local governance geographically.

The following problematic can be raised:

How can municipalities be classified by local governance barometer using spatial analysis?

❖ The importance and objectives of the study:

The importance of this study stems from being one of the first studies to address the topic of good local governance through spatial analysis, as well as learn about the content of good governance and citizens' perceptions about it. This study also arrive at quantitative measures for good governance indicators to provide a database, can be relied upon by decision makers. And classifying citizens' perceptions geographically based on GIS.

The objectives of this study are as follows:

- Assess and classify citizens' perceptions of good local governance through Spatial Analysis;
- Evaluation of good local governance based on quantitative and geographical (spatial) research;
- Provide a detailed explanation of the concept of nearest neighbor and spatial autocorrelation and their application.

❖ Study hypotheses: This research was based on two basic hypotheses:

- There are no differences between municipalities when classifying citizens' perceptions by the local governance barometer;
- There is a spatial Autocorrelation to citizens' perceptions according to their spatial distribution.

❖ **Methodology :**

The descriptive approach was based on giving concepts of local governance and spatial analysis. The quantitative approach was also adopted through the analysis of statistical data in spss program based on the results of the local governance barometer then the application of the spatial analysis (Spatial Analyst) in Geographical Information Systems ArcGIS.

1. LITERATURE REVIEW:

Many studies tried to apply the local governance barometer. It can list some as follows:

❖ (Pact, 2006) entitled "Local Governance Barometer Implantation process handbook": This study was conducted in 2006 through the application of the local

governance barometer, which contains 05 basic criteria. The aim of this study is to access quantitative studies of good governance indicators to be able to compare situations between rural and urban areas, and also comparing regions in different times.

- (Fatoumat , Stéphanie , & Halla , 2007) entitled "Les perceptions des citoyens comme baromètre de la gouvernance locale": This case study 'Public perceptions as a barometer of local governance' has been prepared by a team coordinated by Fatou Cissé from the Norwegian Church Aid (AEN) in 2007. The study describes an experiment to analyse public perceptions of local governance in northern Mali. As well as being an institutional, organisational and operational audit of the implementation of decentralisation and participation by civil society in local governance, this analysis helped AEN to plan activities for vulnerable social groups more strategically, by their perceptions of local governance.
- (Byrne, 2011) entitled "Local Governance Assessments: A Capitalization of SDC Experience": The local governance barometer has been applied in 15 provinces of Botswana, Malawi and Zambia (5 per Country), The objective of this study is to promote understanding of good governance at the district level and to identify governance gaps. The barometer includes dimensions of good governance the following: efficiency, transparency, accountability, rule of law and corruption, participation and the role of civil society organizations in development.
- (SIDA & DANIDA , 2013) entitled "Implementing the Local Governance Barometer in South Sudan": This study was carried in 2013 in southern Sudan in a workshop to implement the local governance barometer in Rubkona and Rumbek counties, this barometer is based on 5 basic criteria and 25 sub-criteria. The results of this process have shown that LGB provides an appropriate framework for analysing and supporting local government strengthening in certain areas within South Sudan, differences in local governance criteria were also recorded in two regions.
- (Ndeye Mariéme, 2014) entitled "Gouvernance Territoriale et participation citoyenne au SENEGAL": This study was conducted in 2013 in Senegal through 11 different regions and the chosen sample was 1000 citizens and 25 civil society organizations, this barometer is based on 5 basic criteria and 22 sub-criteria. The aim of this study was to highlight the role of decentralization in activating good governance and citizen participation in local development, by supporting democracy and encouraging more transparency and accountability.
- (IDRA & Mithulina , 2016) entitled "Local Governance Mapping in ALBANIA": This study was in Albania in 2016, the Government of Albania partnered with the United Nations Program and cooperation with the European Union, the U.S. Agency for Development and the governments of Sweden, Italy and Switzerland in the implementation of this project. Which aims to identify the views of citizens and stakeholders on local government. As for the study sample, 1,200 citizens were distributed across 61 municipalities, the study reached the results of (15 sub-criteria) and the emergence of differences between urban and rural areas.

Good governance studies have included many analytical methods for achieving the best results, but, there are limitations in studies that have addressed the topic of good governance through spatial analysis, because there is difficulty in the availability of data and methods.

2. THEORETICAL FRAMEWORK:

2.1. Good local governance:

The definition of the Algerian legislator to good governance: In the case of Algeria, the term "good governance" appears in Act No. 06/06, which contains the guiding, law of the city. In its Article 2 Chapter I. on general principles, which defines it as: "good governance according to which the administration is interested in the concerns of the citizen and works in the public interest within the framework of transparency". (Loi n° 06-06, 2006, p. 15)

He also talked about it in Article 11 of the same law, where he talked about promoting the good governance in the field of running cities, which is by:

- The development of rational management patterns by using modern means and methods;
- Providing and strengthening the public service and improving its quality. (Loi n° 06-06, 2006, p. 16)

Good governance is defined by the UNDP as characterised by participation, transparency and accountability, efficiency and purposefulness, equality and justice, and the rule of law. Good governance should ensure that political, social and economic priorities are based on a broadly common view in society and that the poorest and most vulnerable groups have an influence over decisions on the division of development resources. (SIDA, 2002, p. 52)

In the 1994 report, Governance: The World Bank's Experience, good governance is briefly defined as a predictable, open and enlightened policy formulation (i.e. transparent processes), a public sector characterised by a professional ethos, the rulers' executive branch taking responsibility for their actions and a strong civil society's participation in public undertakings. All on basis of a society founded on the rule of law. In the bank's strategy document, Reforming the Public Institutions and Strengthening Governance. (SIDA, 2002, p. 52)

Good local governance is not just about providing a range of local services but also about preserving the life and liberty of local residents; creating space for democratic participation and civic dialogue; supporting marketled, environmentally sustainable local development; and facilitating outcomes that enrich the quality of life of local residents. (Anwar , 2006, p. 02)

Local governance comprises as set of institutions, mechanisms and processes, through which citizens and their groups can articulate their interests and needs, mediate their differences and exercise their rights and obligations at a local level. The building blocks of good local governance are many: citizen participation, partnerships among key actors at the local level, capacity of the local actors across all sectors, multiple flows of information, institutions of accountability and a pro-poor orientation. (Leonard, 2007, p. 04)

From this definition, we see that local governance cannot be measured simply through quantifiable indicators, but must include the perceptions of the citizens and the government, and the relationships all actors have with each another. The process of building the capacity for good local governance is equally complex, since it involves a cross-section of actors that includes the government itself, the private sector, and civil society at large. Thus, "for good governance to work there is a need for greater 'mutuality' between these groups - equality and respect to be sought, to establish shared objectives, assign respective rights and responsibilities, as well as mechanisms for cooperation" (Leonard, 2007, p. 05)

2.2. Local Governance Barometer (LGB) :

The Local Governance Barometer was initiated in 2005 during a Local Governance Laboratory in Pretoria. Where the three partners active in capacity development for good governance and improved service delivery at the local level identified the need to develop an instrument, which will assist them in assessing the state of governance at local level and in identifying capacity needs for improved governance. The initial tool was developed in 2006 and was tested in various countries and settings in Africa. Based on these experiences the tool was revised in 2007 and has since than been applied in more than 10 countries in partnership with local NGOs. (UNPD, 2008, p. 60)

The LGB is a tool for measuring the status of participatory governance. It can be defined as an organized set of criteria, sub-criteria and data. The LGB provides quantitative information to better understand the strengths and weaknesses of the governance situation. It allows stakeholders to identify the improvements needed to develop an action plan for reinforcements. (SIDA & DANIDA , 2013, p. 11)

The LGB models main criteria are: (SIDA & DANIDA , 2013, p. 12)

- Effectiveness
- Rule of Law
- Accountability
- Participation
- Equity

Table 1. LGB Criteria and Sub-Criteria

Effectiveness	Rule of Law
1. Clear vision and strategic operational plans	6. Existence of institutional legal framework
2. Good management of financial resources	7. Effectiveness of institutional legal framework
3. Relevant decision-making processes based on reliable information	8. Application of laws
4. Satisfaction towards services	9. Awareness of laws
5. Leadership	10. Responsiveness of laws
	11. Citizen's access to justice
	12. Incidence of corruption
Accountability	Participation and Citizen Engagement
13. Transparency	18. Institutional framework
14. Checks and balances	19. Citizen engagement
15. Recourse	20. Civic engagement
16. Government's responsiveness	
17. Integrity	
Equity	
21. Legal framework recognizing rights of all citizens	
22. Equal opportunity to basic services	
23. Equal opportunity to power	
24. Equal opportunity to resources	
25. Equal opportunity to livelihoods	

Source: (SIDA & DANIDA , 2013, p. 12)

2.3. Objectives of Local Governance Barometer:

The overall objective of the LGB is to describe, analyse and understand local governance situations, in order to develop the capacity of local actors to promote and sustain good governance and improved service delivery. By applying the instrument in a participatory manner, it is both an assessment and capacity-building tool for local

level democratic dialogue. In particular, the Local Governance Barometer aims to: (UNPD, 2008, p. 60)

- Arrive at quantitative measures for good governance indicators to enable a comparative analysis between different situations, an understanding of the evolution of factors of governance, and to evaluate the impact of interventions;
- Ensure the participation of principal actors during the design of governance models, as well as the collection, processing, and analysis of the information collected; (UNPD, 2008, p. 60)
- Measuring governance performance in a participatory and systemic way;
- Identify the strengths and weaknesses of the governance situation, analyse and develop action plans to improve it;
- Monitor and evaluate the effectiveness and impacts of previous governance improvement actions or assess the governance status of the project partner communities. (Ndeye Mariéme, 2014, p. 198)

2.4. Advantages of the LGB:

First and foremost, it allows data to be aggregated into a shared global platform that allows for analysis of governance trends and better informed decision making on regional and national public policy as well as on donor investment priorities. Secondly, it permits the stratification of perspectives of different stakeholder groups including women and marginalized groups. Additionally, the knowledge base system allows users to:

• have an integrated view of governance across sectors and divisions,

•capitalize on the knowledge and experience of the expert individuals/companies in each included field,

•integrate qualitative, as well as, quantitative data, ensuring that the perceptions of concerned citizens and conditions difficult to quantify and capture are included,

• provide a model that is flexible and easily modified, depending on the scale or sector studied,

• reinforce the participative approach. It constitutes a mobilization tool to gather involved actors, as well as, expert individuals/institutions in different fields, to reflect together around a common question,

• build the capacity of in addition to the actors of the scale/sector studied by improving their understanding of the issue and of the means to address it. (Leonard, 2007, p. 10)

2.5. Spatial Statistics:

The spatial dimension of statistics has become increasingly important in the last decade and there are several reasons for that. Firstly, location might per se have a high explanatory value for the results in a survey or a census. Secondly, presentation of statistical results on maps gives an additional dimension to statistics and will often improve the analysis and understanding of results beyond what tables and graphs might give. (SIDA, 2002, p. 24).

2.6. Nearest neighbor method:

The k-nearest neighbor (KNN) is a non-parametric approach that was widely applied to statistics in the early 1970s. According to Wu et al, KNN is regarded as one of the top 10 algorithms in data mining, due to its simplicity, effectiveness, and implementation. The KNN-based classification technique can be effectively applied in

several real world and practical classification tasks in several fields, such as expert and intelligence systems. (Xu , Zhou , Panagiotis , Danial, & Tahir, 2019, p. 4)
The distance between each pair of data (the two points closest to each other) can be calculated by several methods of calculating the distance, including: (Benzaki, 2019)
The Euclidean distance: Distance that calculates the square root of the sum of the square differences between the coordinates of two points:

$$D_e(x,y) = \sqrt{\sum_{j=1}^{n}(x_j - y_j)^2}$$

Distance to Manhattan: the distance from Manhattan calculates the sum of the absolute values of the differences between the coordinates of two points*:*

$$D_m(x,y) = \sum_{j=1}^{n}|(x_j - y_j)|$$

2.7. Spatial Autocorrelation Coefficients*:*

Topic of spatial autocorrelation is not new in specialized research studies as it mentioned in several research studies, e.g. Cliff and Ord (1973), Griffith (1987), Slavík et al. (2011) or Spurná (2008). Nowadays, one of the most commonly used criterion for spatial autocorrelation measurements for quantitative data of the continuous scale is the Moran's statistic (I), developed by Moran (1950).
Moran's I statistic is a standard measure of global spatial auto-correlation, which provides an indication of the degree of linear association between the observation vector (x) and a vector of spatially weighted averages of neighboring values (W). This index can ranged from -1 that indicates a strong negative spatial correlation to +1 who indicate a strong positive spatial auto-correlation and the 0 value indicates that there aren't any spatial auto-correlation. The global Moran's formulation index I is thus: (IDRISSI & SOUAR, 2018, p. 16)

$$I = \frac{n}{S_o}\frac{\sum_i\sum_j W_{ij}\,(x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2}$$

$S_o = \sum_i \sum_j W_{ij}$ (esri, 2019).

Where n the number of observations is, S_o is the sum of the weights, W_{ij} is the (i,j) element. In the spatial weights matrix W, xi and xj are the values on the random variable at locations I And j, and y is the mean on y.
This statistic index can tests the flowing null Hypothesis:

$H0$: I = 0 no spatial autocorrelation
$H1$: I > 0: spatial autocorrelation exists.

We can reject the Null Hypothesis if Z test statistic > 1.96 (or < -1.96), at 5% level. (IDRISSI & SOUAR, 2018, p. 17)
The z_I score for the statistic is computed as: (esri, 2019)

$$z_I = \frac{I - E[I]}{\sqrt{V[I]}}$$

Where :

$$E[I] = \frac{-1}{(n-1)}$$

$$= E[I^2] - E[I]^2 \, V[I]$$

The index fast becoming the standard tool to examine local autocorrelation is Luc Anselin's LISA (local indicator of spatial association), which can be seen as the local equivalent of Moran's I. the sum of all local indices is proportional to the (global) value of Moran's statistic. (Oliveau & Guilmoto, 2005, p. 3)

For each location, LISA values allow for the computation of its similarity with its neighbours and also to test its significance. Five scenarios may emerge:

- Locations with high values with similar neighbours: high-high. Also known as « hot spots ».
- Locations with low values with similar neighbours: low-low. Also known as « cold spots ».
- Locations with high values with low-value neighbours: high-low. Potential "spatial outliers".
- Locations with low values with high-value neighbours: low-high. Potential "spatial outliers".
- Locations with no significant local autocorrelation.

3. APPLICATION FRAMEWORK:

3.1. Data and methods:

The data was collected through the distribution of a local governance barometer directed at Citizens of the El Bayadh municipalities. It contains basic criteria and sub criteria, and it was distributed to a simple random sample consisting of 1040 citizens of different categories and levels. This barometer consists of 65 questions after their validity has been tested and the data collection period lasted more than 6 months (from late April 2018 to October 2018). In this study we used spss software v24 and ArcGIS10.1 for answer research problematic.

A geographic information system (GIS) is a framework for gathering, managing, and analyzing data. Rooted in the science of geography, GIS integrates many types of data. It analyzes spatial location and organizes layers of information into visualizations using maps and 3D scenes. With this unique capability, GIS reveals deeper insights into data, such as patterns, relationships, and situations—helping users make smarter decisions. (esri, 2020)

As for the study method, we rely on the method of the Nearest Neighbor to reach the spatial distribution of the phenomenon. Then Moran index to test the Autocorrelation of municipalities according to the good governance index.

3.2. Results and discussions :

After collecting and tabulating data in spss v24, we calculate the average opinions for each criterion and then the Local Good Governance Index. And The average value is between 0 and 100, according to the Scale for results interpretation of LGB as follows:

Table 2 : Scale for results interpretation

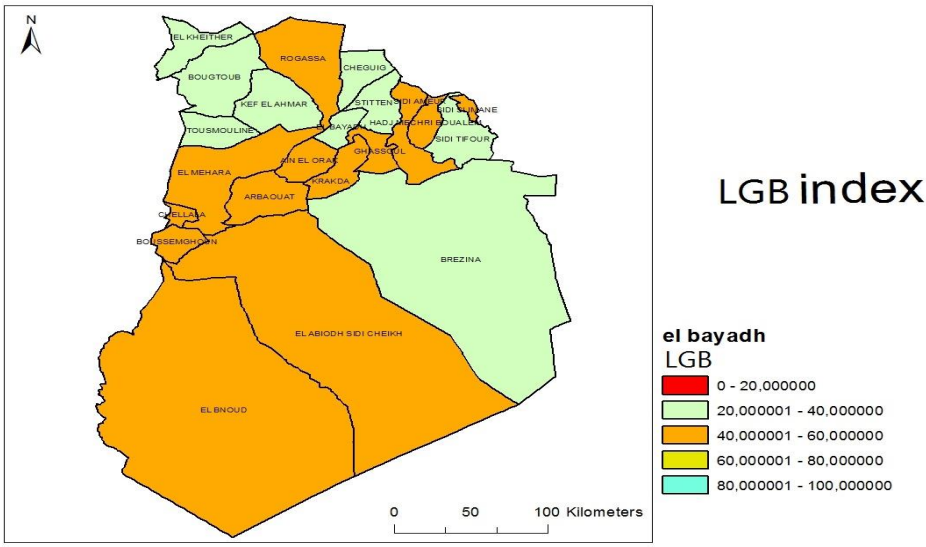
Value	Description
100	Perfect Situation
80	Good
60	Fairly Good
40	Fairly Poor

20	Poor
0	Inexistent No Governance

Source: (Pact, 2006, p. 30)

3.3. Statistical analysis of the Local Good Governance Index:

Fig.1: Local Good Governance Index



Source: Output from ArcGIS 10.1

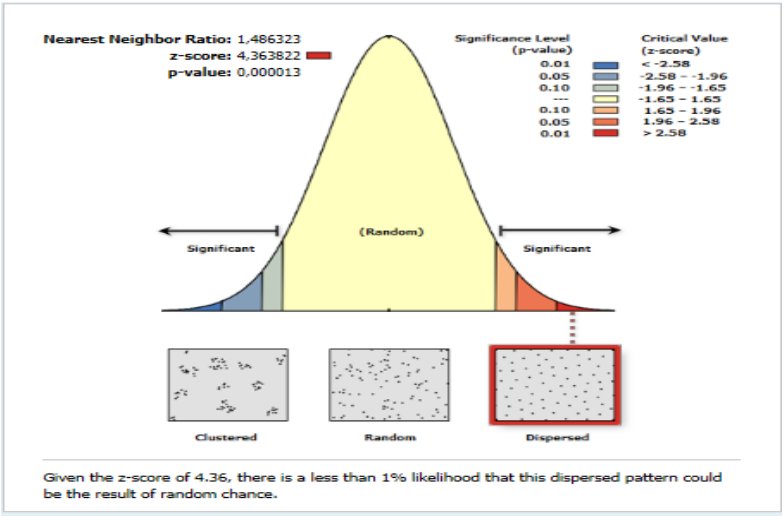
From the above Figure (figure 1), Our results according to the Scale for results interpretation (Table 2) indicate local good governance Index value of 13 municipalities whose average value between (40-60), which is: (Boussemghoun, Chellala, Mehara, Rogassa, Krakda, Ghassoul, Arbaouet, Bnoud, El Abiodh Sidi Cheikh, Ain El Orak, Boualem, Sidi Slimane, Sidi Amar). Where, citizens see that local Governance in these municipalities as Fairly Poor, in many aspects, including planning, financial management and satisfaction with services. Of these, two municipalities (Boussemghoun and Chellala) had strong indicators compared to others.

As for the rest of the municipalities 09: (El Kheiter, Bougtob, Kef Lahmar, Tousmouline, Cheguig, El Bayadh, Stitten, Sidi Taiffour, Brézina). The average indicator of good local governance was between (20-40). That is, these municipalities have poor governance. This indicates that the citizens see the government as having a weak vision for local development, and there is poor satisfaction with services at the local level.

3.4. Analysis nearest neighbor method:

Using ArcGIS10.1, the result of the nearest neighbor is as follows:

Fig.2. The result of the nearest neighbor to the LGB Index



Average Nearest Neighbor Summary

Observed Mean Distance:	0,331104 Degrees
Expected Mean Distance:	0,222767 Degrees
Nearest Neighbor Ratio:	1,486323
z-score:	4,363822
p-value:	0,000013

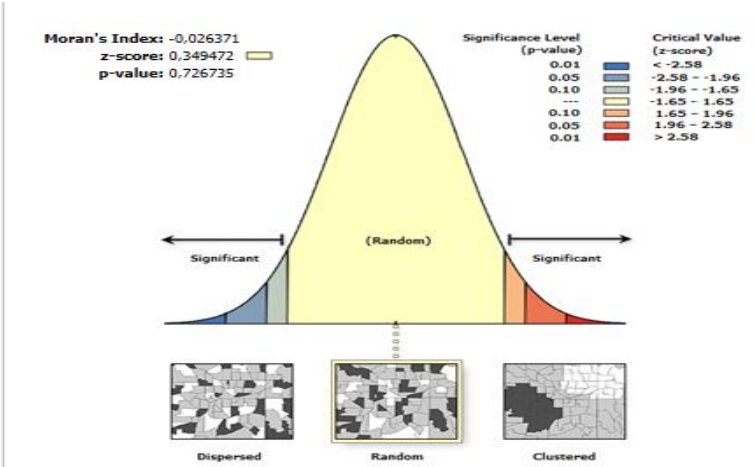
Source: Output from ArcGIS 10.1

Through (Figure 2), we note that the nearest neighbor's value is 1.46. That is, the spatial distribution is dispersed, but it could be random. At the level of significance 0.01. And we notice the z=4.36 value, which is outside the critical value *‹-2.58) (+2.58.* Or it can be compared to the Z_{tab}, so we reject the null hypothesis that the distribution is not random and accept the alternative hypothesis in the sense that the distribution is random. This confirms that there are differences between the municipalities in terms of the views of their citizens, due to several reasons, among them is the divergence of population culture between regions and vast distances, and development also varied because of lack of projects in some regions.

3.5. Analysis of spatial autocorrelation coefficient (Moran's Index) :

Using ArcGIS10.1, the result of the spatial autocorrelation coefficient is as follows:

Fig.3: spatial autocorrelation coefficient (Moran's Index)



Global Moran's I Summary

Moran's Index:	-0,026371
Expected Index:	-0,047619
Variance:	0,003697
z-score:	0,349472
p-value:	0,726735

Source: Output from ArcGIS 10.1

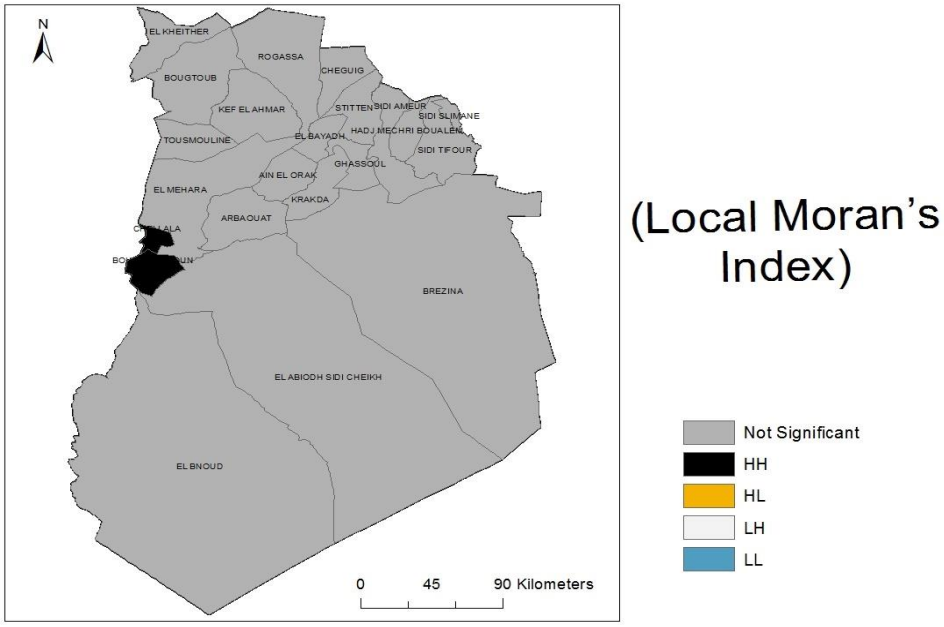
(Figure.3) illustrates the value of the Moran's Index *-0.02637*. So there's a negative spatial autocorrelation, and a dispersion in the distribution pattern, which turns to random. We also note that the p-value is 0.726, through which we accept the null hypothesis, That is, there is no spatial autocorrelation between the municipalities. This is evidence that the distribution is random, that's because there are divergences and differences between regions for the good governance index

This can be traced back to the long distances between the municipalities, and the citizens' dissatisfaction with local services, as well as the disparity in the level of development of the regions, Either because local authorities are inefficient and ineffective, or because civil society is not involved in development decisions. This contributes to creating the divergence between regions in the field of good local governance

3.6. Local Moran's Index :

The result of local Moran's Index calculated by ArcGIS10.1 software of the sample of this study is as follows:

Fig.4: The result Local Moran's Index



Source: Output from ArcGIS 10.1

The results of Local Moran's Index that was indicated in (Figure.4) suggest the presence tow municipalities with high levels (High-High), they are: Boussemghoun and Chellala, it means that is a positive autocorrelations between them, because of the similarity between the two regions and near distance, it also distinguishing them with tourist attractions. And the origins of the citizens and their culture (shaleha).

We see that the rest of the municipalities (20) with (no significant) levels that meant that there is no significant local autocorrelation between regions. This means that the distribution is random.

This confirms that there are differences between most municipalities, in many fields like urbanization, availability of the necessary centers, services to citizens, efficiency of elected councils, effectiveness of local administration and development projects.

CONCLUSION :

This study addressed the theme of good governance, which has become an important topic, especially at the local level. It is based on one of the modern methods of spatial analysis. By classifying municipalities using the nearest neighbor's and the spatial autocorrelation coefficient, the following principals results were reached:

- Through the descriptive statistics of the good local governance barometer, it was found that there are differences between the municipalities, and they were divided into two parts, the municipalities have Fairly Poor governance and the municipalities have poor governance.
- The spatial distribution by the nearest neighbor coefficient is dispersed at the value R_n =1.46.
- Spatial autocorrelation coefficient value (Moran's Index) is:*-0.02637*, which means there's a negative spatial autocorrelation, evidence that the distribution is random.

- Boussemghoun and Chellala are classified from high levels (High-High), a positive autocorrelation, because there's a similarity between the two regions and proximity of distance, as well as the rapprochement of the their population culture. And no spatial autocorrelation between 20 municipalities, as a result of differences and heterogeneity between them according to local spatial autocorrelations. This proves that the distribution is random.

The methods analysis that we have adopted in this paper indicates the existence of spatial divergent among the municipalities. Can conclude that these differences between the municipalities, due to the specificity of each municipality, in terms of its geographical location and population culture, and their participation in the development process. There is a lack of citizen and civil society participation in decision-making, and poor of information related to development projects. As well as the marginalization of some villages and remote areas, including their absence in municipal and sectoral development plans; it means that the poor governance is linked to local government activities. These results can be help government to promote their citizens confidence in local government.

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