TECHNIUM
SOCIAL SCIENCES JOURNAL

Vol. 37, 2022

A new decade for social changes

www.techniumscience.com

ISSN 2668-7798

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

Analysis of regional variation in levels of regional development using the principal components analysis method (PCA). The case of the northeastern region of Algeria

Asma Bouziane[1], **Ahcene Benmissi**[2]

[1]Institute for Urban Engineering Management, University of M'sila, Algeria, [2]Institute for Urban Engineering Management , University of Salah Boubnider Constantine03, Algeria

asma.bouziane@univ-msila.dz, ahcene.benmessi@univ-constantine3.dz

Abstract. The northeastern region of Algeria, like the other Algerian regions, suffers from the problem of regional variation in the levels of development between the various states that make up it, as a result of not taking into account the spatial dimension in the previous development plans. This led to the emergence of clear imbalances, which affected the level of regional development. Therefore, this study aims to highlight this developmental imbalance by relying on natural, social and service indicators, which numbered 50 indicators. Using the principal components analysis method (PCA), which have the ability to reduce the variables to a limited number of factors, in order to highlight the most important variables that had a clear impact on this regional variation. The analysis produced seven main factors, where a large number of variables were associated with the first and second factors, which explained 60.67% of the total variance. The first factor explained 40.87% of the variance. It was linked to the variables related to the services and equipment index, and it included states with a good development level. the second factor explained 19.8% of the variance, and the variables related to the natural indicator were associated with it. It includes states with a medium development level, while the other states have a negative correlation with the first and second factor, and it is related to states with a weak development level, the study concluded that the region suffers from a developmental disparity between the various states that make up it. Therefore, the study recommended the necessity of including the regional dimension in planning, depending on the local capabilities of each state to eliminate regional disparity.

Keywords. Northeast region of Algeria, regional variation, regional development, indicators, Principal components analysis method (PCA)

1. Introduction

The phenomenon of regional variation in levels of economic and social development, is a global phenomenon in various economic systems and their stages of development (W. Day, 2014), where regional disparities remain a major concern for regional policies and regional development(A. Sulaiman, 2010), moreover, regional disparities have become one of the most serious problems in the era of globalization (N. Abbasi, 2021), its roots go back to the concentration of economic activities in general and industrial activity in particular in certain

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

areas, which led to the discrepancy in the levels of development between the regions and regions of the same country (A. Jabri, R. Faraj, 1986), on this basis, the role of regional development policies in some countries began to increase in order to direct spatial development to remove the differences and negative effects left by industrial concentration in specific areas. the issue of achieving balance and reducing the severity of the differences resulting from regional development processes has become the main objective of development strategies in the 21st century, in various countries of the world (F. Naddaf 2012-2013), many studies and mathematical and statistical models have appeared at the schematic level to analyze regional variance and measure the degree of development inequality between regions (A. Abdul-AZIN, S. Al- Khazraji, 2020).

The problem of developmental disparity and the issue of spatial differences in Algeria, has been a topic of great concern since independence, as Algeria inherited from colonialism a very dysfunctional field in terms of the distribution of infrastructure and economic establishments, which was concentrated in the coastal areas, which led to a large population concentration in these areas. 67% of the population is concentrated on an area of 4% of the national territory (SNAT, 2025), this left a clear chasm in the interior and southern regions. therefore, the state after independence sought to try to correct this discrepancy by setting development plans, most of which were characterized by failure, because it was concerned with sectoral development according to a temporal dimension, without taking into account the spatial dimension of development, for not adopting a clear regional development policy, this is evident in the volume of investments taken over by the industrial sector and the hydrocarbon sector, and the neglect of other sectors. the attention was paid to economic indicators only in areas that have chances of development, which led to the emergence of clear spatial differences (economic, social, urban and environmental), the results of which appeared clearly in overcrowded cities that have become surrounded by poverty belts (random housing, environmental pollution, agricultural land retreat..etc), on the other hand, there is a rural center that is poor in terms of the necessities of life, suffering from isolation and marginalization, which has led to its deterioration and the elimination of its resources. the results of the 1998 census came out and gave us a miserable picture of the difficult economic and social conditions in Algeria, where the unemployment rate exceeded 30% and includes 2.1 million people, including young people between the ages of 16 and 19 years, the poverty rate was high, especially in the rural world, 22.6%, as 14% of the population lives below the minimum poverty threshold, while they represented only 8% in 1988, in addition to the high rate of illiteracy, especially among women, 46% (ONS).

All these figures reflect the difficult situation that Algeria experienced during the nineties at all levels, because it coincided with the reforms and preparations to enter the market economy, and thus the transition from the socialist system to the market economy cost Algeria a lot and negatively affected all its financial indicators, which resulted in social and economic problems.

With the beginning of the year 2000 and with the recovery of oil prices, Algeria began a new phase in its development and planning policies alike. the state launched an ambitious policy called the Economic Recovery Policy 2000-2004 with a Keynesian orientation (H. Basush, 2010-2011), which aims to raise the rate of economic growth by increasing the volume of state spending on major projects such as infrastructure and major irrigation projects, with the aim of promoting development and spreading it across the various regions of the country to advance and develop their capabilities, this development plan falls within the framework of a new urban development policy, aimed at reducing the regional imbalance between the various

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

regions of the country, combating poverty and marginalization, and achieving justice in the distribution of projects, as well as in upgrading the population through the development of human resources based on local capabilities. at this stage, the thinking turned to the necessity of taking the spatial dimension with the sectoral dimension of development plans in order to achieve regional development that can achieve balanced growth between the regions of the state, as well as in upgrading the population through the development of human resources based on local capabilities. at this stage, the thinking turned to the necessity of taking the spatial dimension with the sectoral dimension of development plans in order to achieve regional development that can achieve balanced growth between the regions of the state. Within a comprehensive policy that aims to advance the regions by allocating more investments to them without neglecting any region, whether rural or urban, and therefore we find that mechanisms and programs have been developed to advance with all the capabilities and energies available to achieve comprehensive and integrated development in all regions of the country, this is clearly evident in the issuance of the law on preparing the region and its sustainable development, which defined the national strategy for preparing the region, and formed a strong indicator about the inclusion of the regional dimension as a necessity in planning and development, whereas, the National Plan for Territorial Development (M. Ben Noaman, 2011-2012) was approved by Law 10-2 of July 29, 2010, which included a detailed diagnosis of the disparity situation between the various regions in Algeria, In addition to the options available in relation to this problem. he choice was a double valuation of the region, by establishing growth poles to balance the development of the high plateaus and the south on the one hand, And the restructuring of the coastal strip and the hill on the other hand. this view is not limited to restoring the balance between the coast and the interior, but also includes the balance between urban and rural and the sustainable balance of the region (M. Jawad A. Shabae, 2007).

In this scheme, the state focused on the importance of regional planning as an effective tool for solving its development problems and eliminating developmental disparities, by creating planning regions in the light of a new concept of regional development, as one of the main pillars for achieving comprehensive and balanced development among the regions of the same country (SRAT, 2010), as we find that planning in the past depended on the administrative units represented in the states, this planning proved its shortcomings in the various stages of development that Algeria went through, and it was not able to crystallize the real problems. Therefore, it divided its field into 9 planning regions that are geographically and spatially homogeneous and have the same characteristics and advantages, the law defines the regions in Algeria as the regional programming spaces, each of which consists of several contiguous states with similar and complementary physical peculiarities and development destinations (SRAT, 2010), including the northeastern region of Algeria.

This region brings together eight states belonging to different natural environments, coastal and inland, mountainous and plain, varying in the level of economic and social development due to the location and historical balance..etc, however, it is in fact a single block through the interactions that take place within it and the possibilities that we find integrated between some states, but despite the availability of the region on multiple human and natural resources, However, the absence of an effective plan for the region in the various stages it passed through, led to the weakness of its evolution and development, as the region has witnessed negative effects and changes on the physical and environmental demographic reality, so we will try, through this study, to highlight the developmental disparity between the various states constituting the region of northeastern Algeria, in the period between 2008-2016,

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

considering that the last census in Algeria was in 2008, and 2016 estimates based on natural, social and service indicators by applying the principal components analysis method (PCA).

2. Presentation of the study area

northeastern region of Algeria, it is one of the nine programmed national regions, bordered to the north by the Mediterranean Sea, to the south by the eastern high plateaus region, to the east by the Tunisian border, and to the west by the North Central region, it is one of the important regions in view of the population container that it contains, as it is the third Algerian region in

North Central and Northwest regions. It occupies an area estimated
ion density of 164 people / km^2, administratively, it comprises 8
Taraf, Annaba, Skikda, Jijel, and four inland states: Souk Ahras,
distributed over 76 districts with a total of 206 municipalities

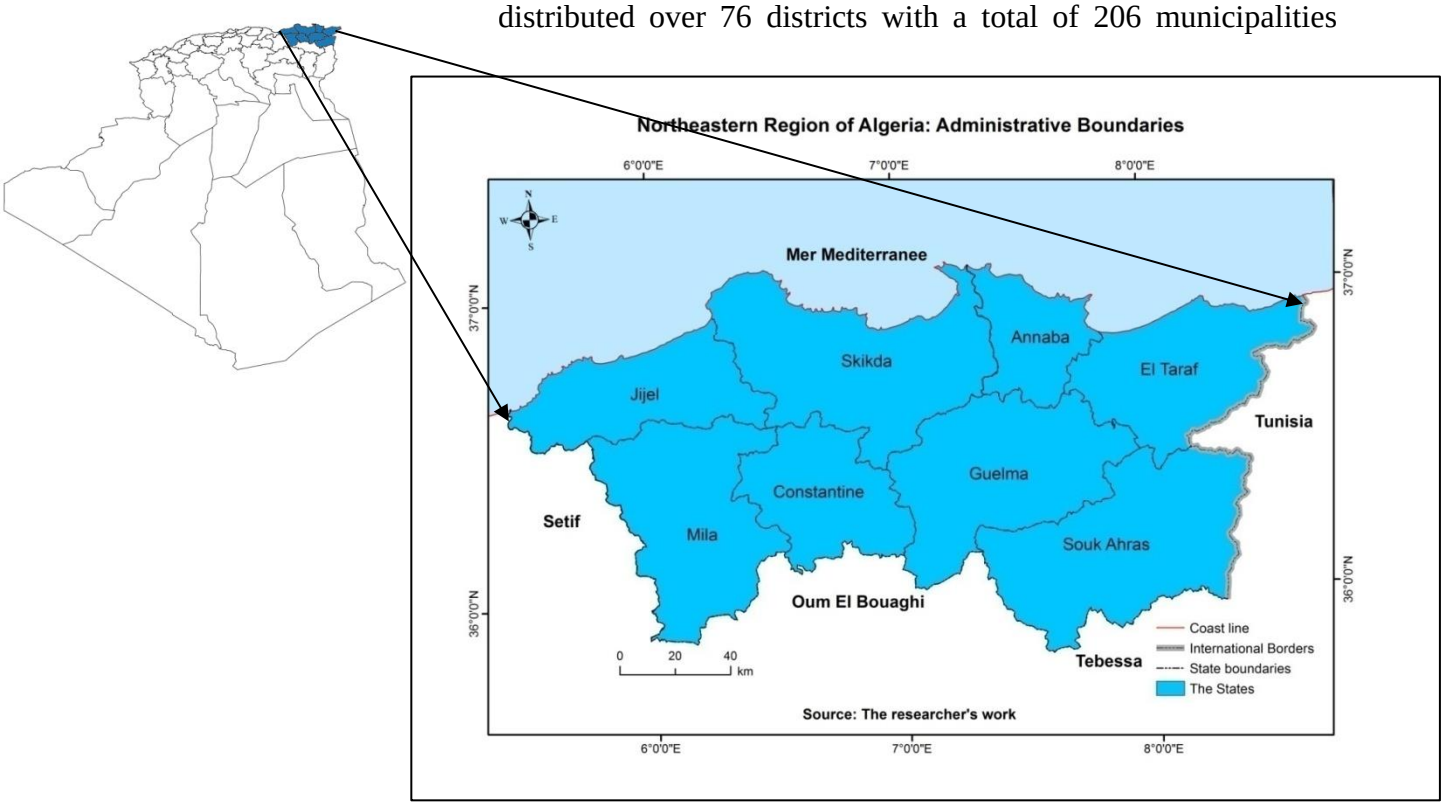

Figure 1: Northeastern region of Algeria: administrative boundaries, **Source**: author 2022.

2.1 The geographical location of the northeastern region of Algeria: economic and commercial importance that has a role in reviving regional development

The northeastern region of Algeria is one of the largest economic and population regions in Algeria, thanks to the diversity of its natural characteristics, which allowed the diversification of economic and social characteristics, as it contains four coastal states (El Tarf, Annaba, Skikda, Jijel), it is characterized by a natural, economic and social richness, and a great cultural heritage. It extends over a coastal strip of 640 km in length, extending east to the Tunisian border, and four internal provinces (Constantine, Mila, Souk Ahras, Guelma) have lands with high agricultural communes. These are the areas of the high plains that are characterized by the extension of wide lands, for the cultivation of grain, these four states comprise 70.5% of the total agricultural land in the region.

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

2.2 Different natural potentials: region Landforms confines important components

The mountainous areas occupy a large area of the region 1782935 hectares representing 75% of its total area, so it is considered one of the hard landforms areas in Algeria. Its general view is printed by the Atlas series that extends along the northern region, and appears clearly in the western side of the region (Jijel, Constantine, Guelma, Skikda, Mila), these states are predominantly mountainous, 80% of their area mountainous, and this is what makes the problem of regional development acutely raised because they contain mountain municipalities.

The region is characterized by the presence of narrow coastal plains Confined between the Atlas hill range in the north, which have important natural features and characteristics, the most important of which are the Annaba plain, the Tahir plain (Jijel), and Korbez in Skikda state, which is one of the wetlands in Algeria and ranked globally, and the Great Plain of Bougues, which includes the Tarf Plain. great economic importance for the presence of many wetlands (Lake Tonga, Opera, Bird Lake), The El Kala Plain is one of the wetlands classified globally by the Ramsar Organization, which is included in the El Kala National Park, which represents an important natural and environmental resource in Algeria. These plains offer great potential for agricultural development on the one hand and population development on the other hand, But it suffers from poor drainage of the narrow coastal plains, which exposes it to flooding, in addition to the coastal strip that is very sensitive to erosion and requires preparations to carry out various activities.

The high plains represent the southern part of the region. They represent a well-defined natural unit, characterized by flatness, which helped establish wide crops (cereals), the most important of which are Ain Abeid in the Wilayat of Constantine, Wade Zenati (Guelma), Meltham (Souk Ahras), Shalghoum El eid (Mila).

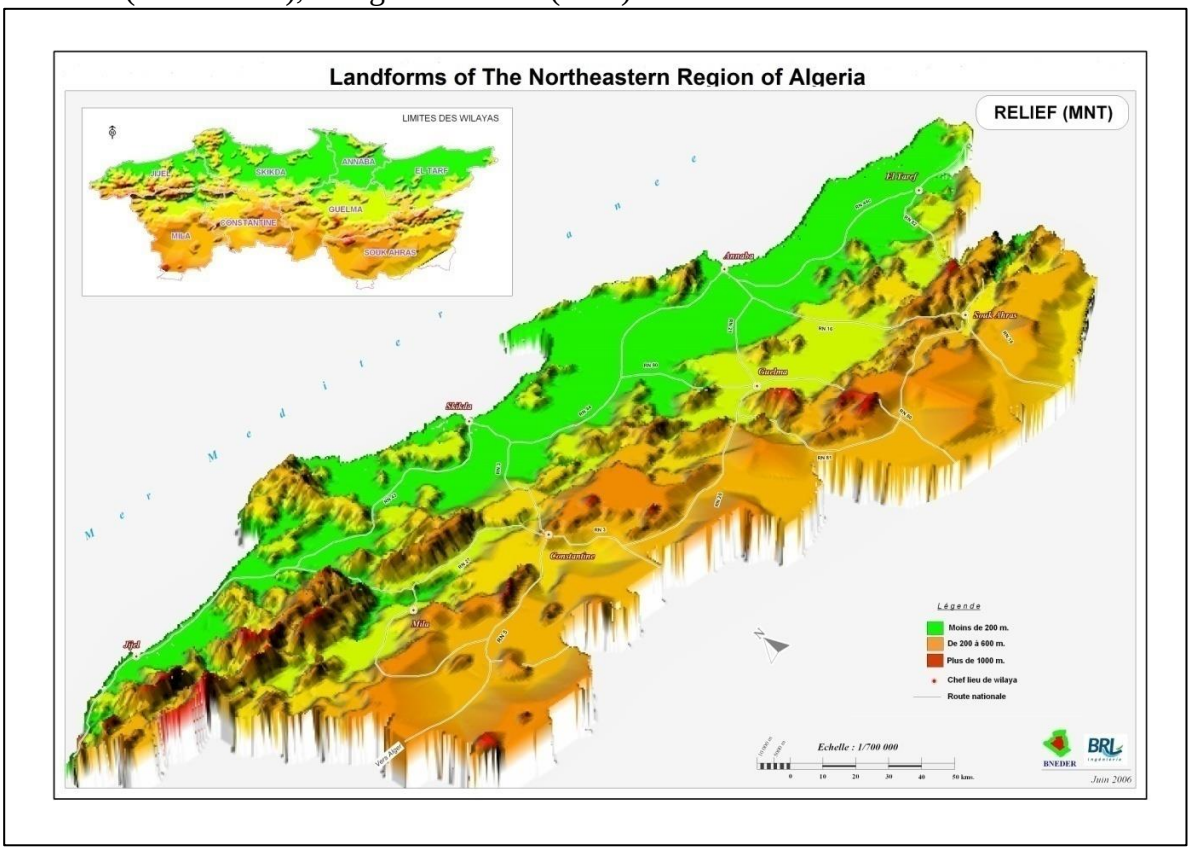

Figure 2: Landforms of the northeastern region of Algeria, **Source: SRAT** 2025 .

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

2.3 The Civilization weight of the region

The region is characterized by the presence of two large cities, with great civilization and economic weight since ancient times, and it is the only region in Algeria that includes two cities of this type, where the various other regions are characterized by the presence of one large city that dominates its territory. These two cities structure the region and give it a great developmental dynamism.

- ***Inner city***: The city of Constantine, the capital of the Algerian east, is an important node for transportation, and a focal point in trade and economic exchanges between the states in the north, and the internal states in the hills, and its radiance extends to the southern regions. A cultural center and a great civilization radiation through the services it provides, as it contains various aspects of urban, social, cultural and recreational life, in addition to important industrial vehicles (compounds of engines and tractors), this geographical position and the functional status of the state of Constantine in the regional framework, makes it a dominant pole in the northeastern region of Algeria, which suggests the role it will play, which is no less than the role of any metropolitan pole.
- ***Coastal city***: Annaba is one of the major coastal cities in eastern Algeria. It is also one of the most important major industrial poles, which was chosen to lead the comprehensive development process across the country, with the presence of the most important industrial compounds, the El Hajjar iron and steel complex. It is a dominant pole in the northeastern region of Algeria, where its coastal location gives it a national and international weight, as it represents a trade gateway linking it to global foreign markets through its port. This privileged position of the city of Annaba gives it the possibility of openness to the international field, and thus it is considered as a complementary pole and a competitor to the pole of Constantine in the region.

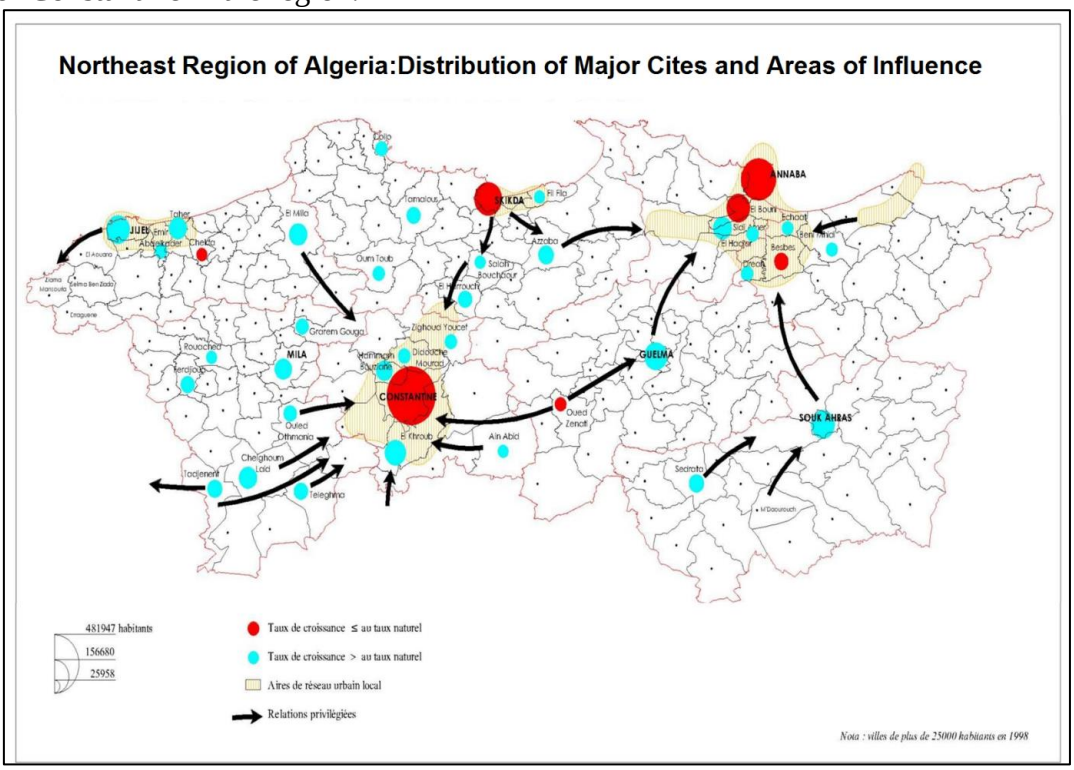

Figure 3: Northeastern region of Algeria: Distribution of Major Cites and Areas of influence, **Source: SRAT** 2025 .

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

3. Materials and methods

The aim of this work is to assess the regional variation in the level of regional development between the constituent states of the Northeastern region of Algeria, which represent 8 states, Using the principal components analysis method (PCA), which is one of the methods of multivariate statistical analysis (A. Chiriac et al, 2022), it is a technique that uses complex basic mathematical principles (M. Richardson, 2009) as it is a powerful tool for reducing and summarizing information when there is a large amount of quantitative data (M. Guerrien 2003), Where the initial variables can be grouped into a limited number of synthetic indicators called factors that are simpler and clearer to explain (S. BOUSSIDA, 2018). The method depends on the completion of the Pearson correlation matrix in the event of different units of measurement, and then extracting the main factors from the study variables, in order to obtain a table of the correlation of variables with the main factors, and a table of distribution of standard scores for factors over observations.

The work was carried out in two phases:

3.1 The first stage: selection of study variables

The study's 50 variables were selected, which were classified within natural, social and service indicators, given that they have an impact on the level of regional development.

Table 1. Indicators

natural indicators	**social indicators**
- The percentage of plains - Ground water (hkm^3) - Surface water (hkm^3/year) - The percentage of actually exploited agricultural area of total agricultural area - Percentage of irrigated land -The percentage of pastures in the total agricultural area -Extensive cultivation area -Forest coverage rate - Agricultural area per person	- population growth rate - Population density - Reading literacy percentage - Female literacy percentage. - schooling percentage - The percentage of the population in the urban agglomerations - The percentage of Urbanization - Activity rate. - The percentage of workers in the agricultural sector - The percentage of workers in the industrial sector - The percentage of workers in the public works sector - The percentage of workers in the service sector.
Equipment and services indicators	
- The percentage of connection to the Drinking water - The percentage of connection to the sewage network - The percentage of connection to the Electricity - The percentage of connection to the Natural gas - The percentage of connection to the Internet - The percentage of connection to the phone - Number of hospitals.	- Municipal road (km / 1000 inhabitants) - Density of roads / 1000 inhabitants - Road density / km^2 - The percentage of construction establishments for the region. - The percentage of trade establishments to the region - The percentage of industrial establishments for the region

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

- Specialized private clinics - Number of beds / 1000 inhabitants - Number of health structures / 1000 inhabitants - Number of pharmacies/1000 inhabitants - Number of general doctor /1000 inhabitants - Number of private doctors/ 1000inhabitants - The number of professional formation centre - National road (km per 1000 inhabitants) - State road (km / 1000 inhabitants)	- The percentage of service establishments for the region - The value of investing in the agricultural sector - The value of investment in the industrial sector - The value of investment in the public works sector - The value of investing in the health sector -The value of investing in the transport sector - The value of investing in the services sector

Source: author

3.2 The second stage: the analysis of these indicators was carried out using the principal components analysis method (PCA) using the statistical program (2016XL STAT)

At the beginning, the data were entered into the program (XL STAT2016), Pearson analysis was used in order to standardize the units of measurement and to achievement the correlation matrix.

Through this matrix, the correlations between the various study variables were extracted.

Then extract the main factors by principal components analysis method (PCA), where the saturations of the variables were dropped on the derived factors, in order to explain their importance. Finally, the standard scores for the derived factors were distributed to the states to determine their level of development, and to highlight the regional variation.

4. Results and discussion

The use of the principal components method (PCA) made it possible to extract the principal factors; each factor includes a set of variables associated with it.

4.1 Extracting Derivative Principal Factors

7 base factors were extracted from the original variables by the principal components method (PCA), and the table shows the values of the latent roots and the explanatory and cumulative ratios of the derived factors.

Table 2 of latent roots, explanatory and cumulative ratios of the derived factors

	F1	F2	F3	F4	F5	F6	F7
Proper value	20,438	9,900	5,809	4,737	3,260	3,125	2,732
Variability (%)	40,877	19,800	11,617	9,473	6,520	6,250	5,463
Cumulative (%)	40,877	60,677	72,294	81,767	88,287	94,537	100,000

Source: Principal Component analysis method (PCA) Outputs

We note that the first factor is the most important derived factor in terms of interpretation ratios, as it explained 40.88% of the variance of the variables (from the information included in the study variables), The second factor explained a percentage of 19.8%, the third factor 11.62%, the fourth factor 9.47%, the fifth factor 6.52%, the sixth factor 6.25% and the seventh factor 5.46%.

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

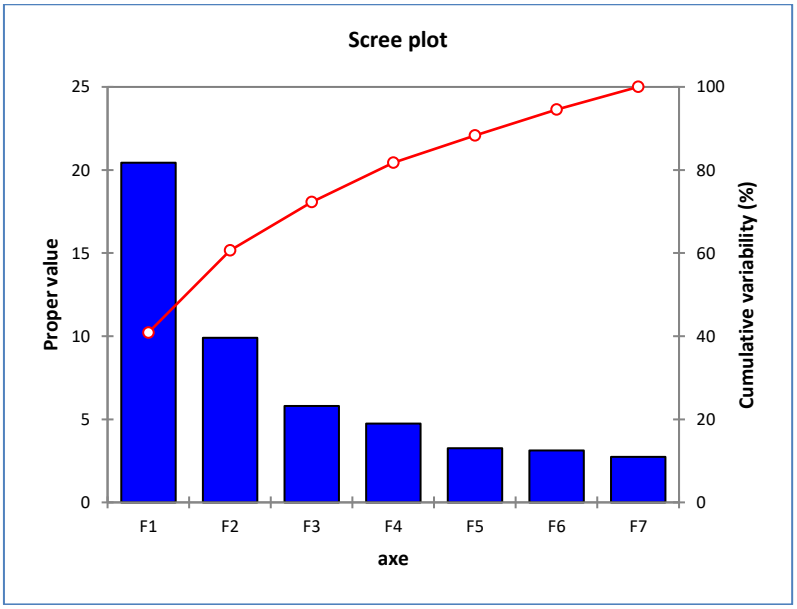

Figure 4: Distribution of eigenvalues according to the ranks of the main axes **Source**: Principal Component analysis Method (PCA) Outputs.

The (table 2) and (figure 4) show that the first and second variables explain 60.67% of the total variance of the factors, and this percentage is sufficient for interpretation, so we will focus in the analysis on these two factors.

4.2 Distribution of variables to factors

From (Table 3), which shows the distribution of variable saturations on the factors, the importance of the original variables within the derived basic factors appears.

Table 3 Correlation of variables with factors

	F1	F2	F3	F4	F5	F6	F7
% plains	-0,454	-0,605	-0,419	-0,418	-0,224	-0,060	-0,156
Underground water	0,612	0,407	0,337	-0,212	0,440	0,297	0,139
Surface water	-0,156	0,220	0,754	-0,085	-0,313	-0,224	0,452
Population growth rate	-0,543	-0,282	0,205	0,029	0,739	-0,049	0,187
Population density	0,964	-0,014	-0,137	-0,051	0,044	-0,184	-0,111
% Literacy	0,844	0,220	-0,328	0,260	0,216	0,129	0,027
%Female Literacy	0,873	0,075	-0,375	0,151	0,225	0,110	0,076
%Schooling	0,521	0,466	-0,198	-0,214	-0,310	0,572	0,051
%population of urban agglomerations	0,436	-0,603	-0,176	0,146	-0,318	0,092	0,535
%Urbanization	0,868	-0,354	-0,307	-0,040	0,108	-0,023	0,116
Activity rate	0,783	0,122	0,580	-0,082	0,150	-0,083	-0,001
% Workers in agriculture	0,177	-0,387	0,703	-0,365	-0,108	0,236	-0,352
%Workers in industry	0,535	-0,155	-0,534	-0,146	-0,276	-0,531	0,158
%Workers in public works	-0,537	-0,026	-0,148	0,790	-0,118	0,178	0,138
%Workers in services	-0,313	0,744	0,299	0,362	0,214	0,120	0,260

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

٪Exploited agricultural area/total agricultural area	-0,247	-0,615	-0,068	-0,640	0,233	-0,153	-0,265
%Irrigated lands	-0,106	0,840	-0,301	-0,402	0,127	0,054	0,109
%Pastures /total agricultural area	0,287	0,477	0,125	0,732	0,036	0,180	0,324
%Extensive cultivation area	-0,065	-0,841	0,492	0,083	-0,062	-0,003	-0,191
%Forest coverage	-0,100	0,844	-0,470	-0,132	0,021	-0,027	0,195
Agricultural area/person	-0,577	-0,549	0,192	-0,024	-0,422	0,257	0,291
%connection drinking water	0,610	-0,532	-0,351	-0,240	-0,059	0,360	0,174
% connection sewage network	0,549	-0,640	-0,121	-0,334	-0,041	0,283	0,285
%Electrical connection	0,603	-0,301	0,197	0,528	-0,338	0,173	-0,290
%Gas connection	0,696	-0,574	0,057	0,296	-0,227	-0,079	0,192
%Internet connection	0,902	-0,414	-0,009	0,020	0,118	0,021	-0,015
%Phone connection	0,411	-0,564	0,243	0,237	-0,021	0,628	-0,057
N .Hospital	0,876	0,298	-0,175	0,073	-0,098	-0,071	-0,305
Specialized private clinics	0,964	-0,155	0,058	-0,052	0,171	-0,058	0,085
beds in the hospital/1000	0,846	-0,316	-0,331	-0,033	0,145	-0,093	0,211
Health institution/1000R	-0,832	0,179	0,266	-0,389	-0,120	0,185	-0,072
N, Pharmacies/1000R	0,648	0,638	-0,279	0,214	0,044	-0,005	-0,220
N, General doctors/1000R	0,580	-0,237	0,296	0,167	0,550	0,428	0,080
N .Private doctors/1000inhabitants	0,576	-0,482	-0,026	0,341	0,374	-0,195	0,374
N. Professional formation centre	0,830	0,434	-0,167	-0,184	-0,167	0,146	-0,104
National roads/1000 inhabitants	-0,894	-0,365	-0,025	0,065	0,175	0,033	0,175
State roads/1000 inhabitants	-0,168	0,388	-0,053	-0,273	-0,269	0,709	0,411
Municipal roads/1000 inhabitants	-0,902	-0,168	0,164	0,278	0,045	-0,162	0,161
Road density/1000inhabitants	-0,930	-0,160	0,127	0,207	0,036	-0,044	0,215
Road density/klm2	0,281	0,495	0,571	0,472	0,122	-0,216	-0,256
%public works E/Region	0,713	0,172	0,242	-0,482	-0,237	-0,022	0,338
% Trading E/Region	0,877	0,020	0,449	-0,081	-0,020	-0,083	-0,121
%Industrial E/Region	0,789	0,165	0,545	0,079	-0,138	0,086	-0,141
%Services E/Region	0,820	-0,079	0,519	-0,101	-0,047	-0,026	-0,199
Agricultural investment	0,286	0,802	-0,297	0,215	-0,340	-0,156	-0,044
Industrial investment	0,310	0,393	0,509	-0,478	0,074	-0,264	0,432
Investing in public works	-0,254	0,093	-0,330	-0,376	0,745	0,325	-0,125
Investing in the health	0,531	-0,574	-0,216	0,140	0,148	-0,469	0,284
Investing in transportation	0,984	0,003	0,011	-0,073	-0,105	-0,115	-0,054
Investing in services	0,257	0,441	0,538	-0,451	0,018	-0,324	0,375

Source: Principal Component analysis Method (PCA) Outputs.

Where it is possible to extract the important variables that are related to the first and second factors, as shown by the correlation circle, which represents the projection of the primary variables on two axes, the first axis (F1) and the second axis (F2), which explain 60,68% of the total variance of the variables.

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

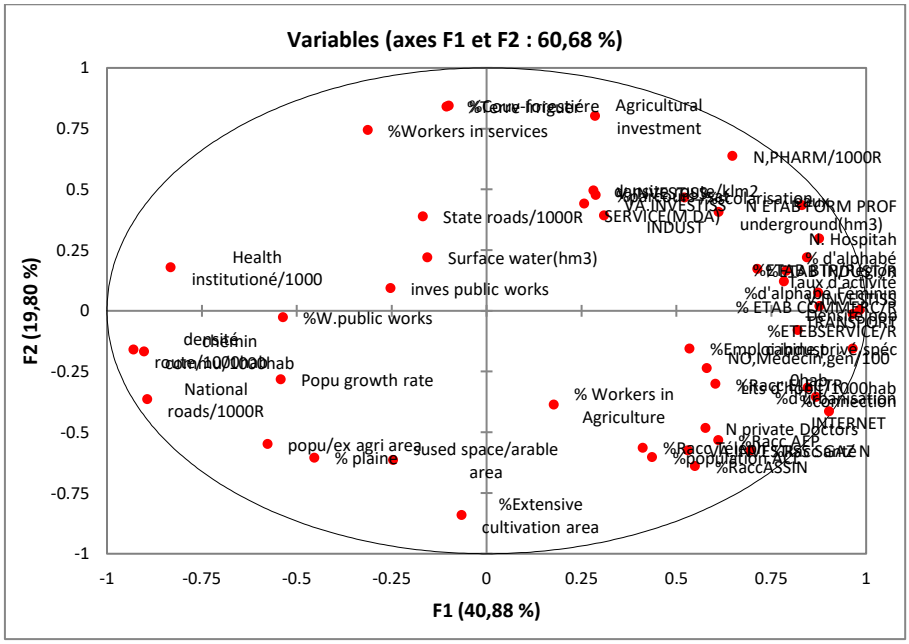

Figure 5: The circle of correlation of variables with factors (F1) and (F2), **Source**: Principal Component analysis Method (PCA) Outputs.

4.3The first factor (F1)

This factor includes indicators with a strong correlation with a positive sign, indicators with a strong correlation with a negative sign, and medium indicators with a positive sign.

4.3.1 Indicators with a strong correlation with a positive signal

Population density index, schooling percentage, female schooling percentage, urbanization percentage, internet connection percentage, number of hospitals, specialized private clinics, number of hospital beds/1000 inhabitants, number of vocational training centers, percentage of trade establishments, percentage of service institutions, investment in the transport sector .

Table 4 Variables with a strong correlation with a positive signal

Indicators	**Correlation value**
Population density	0.964
schooling percentage	0.844
Female literacy percentage.	0.873
The percentage of Urbanization	0.868
The percentage of connection to the Internet	0.902
Number of hospitals.	0.876
Specialized private clinics	0.964
Number of beds / 1000 inhabitants	0.846
The number of professional formation centre	0.830
The percentage of trade establishments to the region	0.877
The percentage of service establishments for the region	0.820
The value of investing in the transport sector	0.984

Source: The author achievement based on the Principal Component analysis Method (PCA) Outputs

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

These indicators are a population- special part, and a section for health, educational and technological equipment, trade and service establishments, and investment in the transport sector. It means that there is a strong relationship between the presence of health and educational equipment, which leads to a high population density and an increase in the percentage of urbanization, in addition to investment in the transport sector, which leads to the spread of commercial and service institutions.

4.3.2 Indicators with a strong correlation with a negative signal

This indicator includes the total health structures, the percentage of national roads/1000 inhabitants, municipal roads/1000 inhabitants, and the density of roads/1000 inhabitants

Table 5 Variables with a strong correlation with a negative signal

Indicators	**Correlation value**
Number of health structures / 1000 inhabitants	-0.832
National road (km per 1000 inhabitants)	-0.894
Municipal road (km / 1000 inhabitants)	-0.902
Density of roads / 1000 inhabitants	-0.930

Source: The author achievement based on the Principal Component Method (PCA) Outputs

Despite the good coverage of the health sector, the total health structures are insufficient, and despite the increased investment in the transport sector and the extension of the road network, they remain insufficient for the population, and also for the municipalities, especially if we know that the western part of the region has difficult Landforms.

4.3.3 Indicators with average correlation with a positive signal

This indicator includes: Ground water, activity rate, the percentage of connection to the Drinking water, the percentage of connection to the Electricity, The percentage of connection to the Natural gas, Number of pharmacies/1000 inhabitants, the percentage of construction establishments for the region, the percentage of industrial establishments for the region.

Table 6 Variables with average correlation with a positive signal

Indicators	**Correlation value**
Ground water (hkm^3)	0.612
Activity rate.	0.783
The percentage of connection to the Drinking water	0.610
The percentage of connection to the Electricity	0.603
The percentage of connection to the Natural gas	0.696
Number of pharmacies/1000 inhabitants	0.648
The percentage of construction establishments for the region	0.713
The percentage of industrial establishments for the region	0.789

Source: The author achievement based on the Principal Component Method (PCA) Outputs

These indicators are represented in the connection to the various networks, and the correlation of the activity rate with the presence of industrial establishments and building materials establishments.

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

In general, it can be said that the first factor included the various equipment and services that the region contains, including educational, health and economic equipment, and the level of connectivity in the various networks, as there is a strong correlation between these facilities and population density and the rate of urbanization and schooling, Increasing each of them leads to an increase in the other. This factor also showed a strong negative correlation in the total health structures and roads of various types, Despite the high investment in the transport sector, the roads remain insufficient in terms of development, because the region is landform area dominated by mountainous rural municipalities, and the vast areas of some marginalized rural plain municipalities, especially in the state of Souk Ahras.

4.4 The second factor (F2)

4.4.1 Indicators with a strong correlation with a positive signal

The percentage of workers in the services, the percentage of irrigated area, the percentage of forest coverage, the value of investing in the agricultural sector.

Table 7 Variables with a strong correlation with a positive signal

Indicators	**Correlation value**
The percentage of workers in the service sector	0.744
Percentage of irrigated land	0.840
Forest coverage rate	0.844
The value of investing in the agricultural sector	0.802

Source: The author achievement based on the Principal Component Method (PCA) Outputs

We note that there is a correlation between agricultural investment and the irrigated area and the forested area, as the increase in investment in the agricultural sector increased the irrigated area.

4.4.2 Indicators with correlation with a negative signal

The percentage of the plains, the population in urban agglomerations, the percentage of the area used in agriculture to the total agricultural area, the area of large cultivations, the sewage connection, the investment in the health sector, the telephone connection

Table 8 Variables with correlation with a negative signal

Indicators	**Correlation value**
The percentage of plains	-0.605
The percentage of the population in the urban agglomerations	-0.603
The percentage of pastures in the total agricultural area	-0.615
Extensive cultivation area	-0.841
The percentage of connection to the sewage network	-0.841
The value of investing in the health sector	-0.640
The percentage of connection to the phone	-0574

Source: The author achievement based on the Principal Component Method (PCA) Outputs

We note that these indicators have a negative correlation, and they are mostly natural indicators, as despite the availability of the plains that contain agricultural lands with important areas suitable for large cultivations, their exploitation is weak, other indicators are negatively

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

related to the natural elements because these areas are rural, as they suffer from a lack of services such as the health sector, and a lack of various networks, sanitation and the telephone network.

In general, it can be said that this indicator is the collection of natural data that are mainly related to agricultural activity, as the region owns important agricultural areas, but its exploitation is weak due to climatic factors on the one hand, a lack of equipment, however, investment in the agricultural sector has increased the percentage of irrigated area, which is an indication of the beginning of interest in this sector, the region also contains important forest wealth that is waiting for rational exploitation. This factor also indicates a negative correlation of the proportion of the population in urban agglomerations, sewage networks, and telephone And investment in the health sector, where these characteristics we find an essential advantage of marginalized rural areas.

4.5 Classification of states according to factors

The table 9 shows the distribution of standard scores for the derived factors over the states of the region

Table 9 Distribution of standard scores on the derived factors for the states of the region

Observation	F1	F2	F3	F4	F5	F6	F7
Jijel	0,630	5,364	-1,523	4,071	-0,579	0,204	-0,407
Skikda	0,328	4,336	3,807	-2,375	0,004	-1,150	1,641
Annaba	5,149	-0,630	-3,829	-2,375	-1,690	-1,809	-0,252
Guelma	-2,229	-2,003	0,196	-0,331	-2,712	3,252	1,365
Constantine	8,230	-3,016	1,181	1,342	2,354	0,913	0,700
El taraf	-5,060	1,184	-2,530	-2,058	3,076	1,385	-0,507
Souk ahras	-6,107	-3,845	0,023	1,960	0,236	-2,648	1,290
Mila	-0,942	-1,389	2,675	-0,234	-0,690	-0,145	-3,828

Source: The author achievement based on the Principal Component Method (PCA) Outputs

4.5.1 The first factor

The table shows that the highest concentration of standard degrees for this factor appeared in Constantine, followed by Annaba, this factor is associated with a large number of variables(population, equipment and services) , these are indicators that highlight the developmental development. Thus, it can be said that these two states have a good level of development, as each of them contains a metropolitan capital; this led to an increase in population concentration and urban growth, in addition to the concentration of equipment and services. bay the other states, they recorded negative normative values with this factor, except for the states of Jijel and Skikda, but with weak values. The first is due to the concentration of some industrial activities such as the petrochemical industry and the presence of the port, and the second has known a developmental renaissance In the recent period, the presence of the port of Jin Djen, which is a preferred port outlet for many African countries towards Europe, which is expected to play a major role in development at the level of Jijel state, and at the level of the northeastern region of Algeria.

Technium Social Sciences Journal
Vol. 37, 556-572, November, 2022
ISSN: 2668-7798
www.techniumscience.com

4.5.2 The second factor

The highest concentration of standard degrees for this factor is in the states of Jijel and Skikda, and to a lesser extent, the state of El Taraf, because it is a state with natural and environmental specificities.

The second factor was linked to the variables related to the agricultural sector and forests, and these states are coastal, covered by forest wealth, and it is an important economic resource, in addition to the availability of nature reserves, which makes it a tourist destination par excellence, but these states still suffer from a lack of services and equipment due to their Landforms.

The other states had a negative association with the first and second factors, and they are the interior states, the areas of the high plains, containing important agricultural lands for the production of grain, Guelma Province, Souk Ahras, Mila. It still suffers from isolation and marginalization, as most of its municipalities lack the minimum conditions of life.

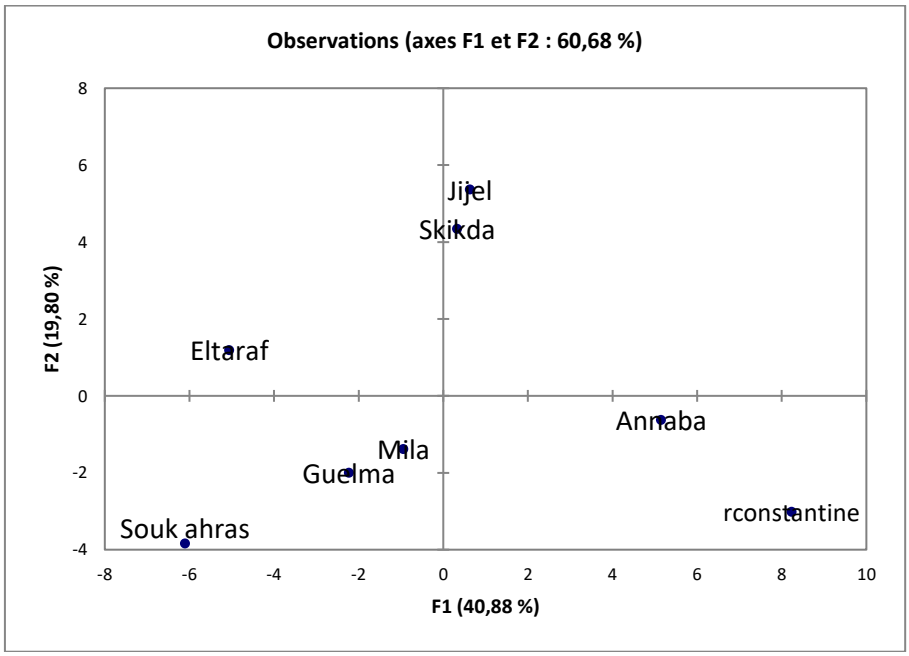

Figure 6: Distribution of the standard scores for the states on the axes (F1) and (F2), **Source:** The author achievement based on the Principal Component Method (PCA) Outputs

5. Conclusion

The study concluded that the northeastern region of Algeria suffers from a regional variation between the various states that make up it, as each state of the region is characterized by special economic and social advantages that determine its level of growth, however some states, according to their historical status, still benefit from the advantages of agglomeration resulting from the specialization and concentration that made some types of economic activities evolve within the same direction (Constantine and Annaba states), among the factors contributing to the creation of these disparities are the results of unequal public policies among all parts of the national territory, and the failure to target regional development according to a spatial approach.

Therefore, the study recommends activating the role of regional planning (regional layout) through the optimal investment of the natural and human resources available in the

region, regulating economic and social life within its constituent states, down to the level of municipalities, Because the manifestations of imbalance in the Algerian sphere and in the northeastern region of Algeria do not appear between regions and their geographical distribution not only the coast, the interior, the south, but also between the city and the countryside, and between the plain and the mountain, because sectoral planning is prevalent in Algeria, while comprehensive regional planning is still new, it did not rise to the level that would allow it to play a prominent role in the development of the integrated regional plan for economic and social development.

Achieving balanced development between the states of the region does not only require the provision of basic equipment and important services, but also needs, concurrently, to build a production base based primarily on the region's own data and its development components, and to a targeted national strategy that stimulates directing investments and activities to less developed areas, this can only be done through the integrations that must be made between these spatial units, by searching for the latent local energies and investing them in a way that achieves functional homogeneity, which will be reflected in the comprehensive development of the region.

References

[1] A. Sulaiman: Regional Disparity in large Territories the case of Canada and China, department of Geography, thesis presented to the Faculty of Graduate studies with a view to obtaining the degree of doctorate in geographe, the Faculty of art and Sciences, University of Montreal , july 2010.

[2] A. Jabri, R. Faraj: Regional Budget in Development, Ministry of planning, Planning Commission Regional, Study No (152), Baghdad,1986,p6.

[3] A. Chiriac, R. Mititelu,.A. Nisulescu: Multivariate statistical analysis of the regional anti-fraud Directorate 2 Constanta from 2014-2021;Social Sciences Journal, ISSN: 2668-7798, Vol 35-2022 p375-366.

[4] A. Abdul-AZIN, S. Al- Khazraji: Applied Methods in Analyzing Regional Development Indicators- Najaf Province as a Model, Al-Adab Jornal, Supplement Issue 134,September, 2020.

[5] H. Basush: Major Projects in Algeria and their role in economic development status: east-west motorway, master's degree in economic sciences, Faculty of Economics, management and Commercial Science, University of Algiers3, 2010-2011 p 62.

[6] F. Naddaf: Analytical Study of the Regional and Territorial Differences and Disparities Towards formulating a Directive Method To Reduce The Intensity of The Disparities – Case of The Syrian Governorates, A thesis prepared for Obtaining a master's degree in Urban Planing at The Faculty of Architecture at Tishreen University 2012-2013.

[7] M. Guerrien: L'intérêt de l'analyse en Composantes Principales(ACP) pour la recherche en sciences sociales; Open Edition journals 43-2003 p181-192.

[8] M. Richardson: Principal component analysis, may 2009

[9] M. Ben Noaman: Contribution of Smal and Medium Enterprises to Achieving Balanced Local Development, Local, Balanced Geographical, Case Study of Boumerdes Province (Algeria),Master's Note in Management Sciences, University of Algiers3, Academic Season 2011-2012 p 75

[10] M. Jawad, A. Shabae: Industry and Itsffect on The Regional Development in Al-Najaf Governorate, Partial Fulfillements of Requirements for M.A Degree In Geography, University of kufa ,April 2007 p35

[11] National Development Plan of The Territory (SNAT), Algeria2025
[12] N. Abbasi, F. Mrad, S. Nafti and M. Ali: Regional Emloyment Disparities in Tunisia Post 2011: A comparative Study using ESDA, Technium Social Science Journal, ISSN2668-7798, vol24,371-388 octobre 2021,
[13] National Statistics Office (ONS).
[14] Regional development plan for Territory of the Program Region North East(SRAT), By 2025.
[15] S. BOUSSIDA ;Imed ben Rabah . Rim ben salline Indicateur de Développement Régional: Méthodologie et résultats, Notes et analyse de l'tceq N°1-2018,Institut tunisien de la compétitivité et des etudes quantitatives.
[16] W. Day ,The application of regional policies for economic intelligence in Algeria, reality and prospects, economic Sciences, The thirty fifth issue ,volume ninth, March 2014.