

An Attempt to Identify Urban Networks based on Social and Economic Agglomerations in the North East Region of Algeria

محاولة لتحديد الشبكات الحضرية القائمة على التجمعات الاجتماعية والاقتصادية في المنطقة الشمالية الشرقية من الجزائر

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Date of receipt: 30/01/2022, Date of revision: 27/02/2021, Date of acceptance: 21/03/2022

Abstract

ملخص

The North East Region of Algeria is a privileged region with a strategic location that gives it an international vocation, a distribution of cities based on natural resources, however, lately a change occur in the urban growth away from ancient big cities declaring urban and regional networks.

A complex regional network that we need to identify its elements separately according to previous studies with the purpose of planning future development, we conducted a thematic analysis of urban networks using a deductive and semantic approach, Firstly we created the urban network of each wilaya based on the size of its demographic agglomeration.

Secondly, we identify their models of growth, the possible causes of growth, and the interpretation of growth based on the urban network form and the social and economic data presented in the regional planning document the SRAT.

Finally, we present a spatial identification of the eight urban networks where we present the models of growth corresponding to the network urban form and we cite the possible causes of that form based on previous studies and available data.

Keywords : urban growth, development potentials, regional planning, urban network, metropolitan complementarity, demographic evolution, Algeria.

المنطقة الشمالية الشرقية في الجزائر منطقة متميزة ذات موقع استراتيجي يعطيها أهمية دولية، توزيع المدن في المنطقة كان على أساس الموارد الطبيعية، ولكن في الآونة الأخيرة حدث تغير في النمو الحضري بعيدا عن المدن الكبيرة القديمة معلنا عن شبكات حضرية وإقليمية جديدة.

شبكة إقليمية معقدة نحتاج إلى تحديد عناصرها بشكل منفصل وفقا لدراسات سابقة بغرض التخطيط للتنمية في المستقبل، الهدف من دراستنا هو اجراء تحليل مواضيعي للشبكات الحضرية باستخدام نهج استنتاجي واستدلالي، أولا أنشأنا الشبكة الحضرية لكل ولاية استنادا إلى حجم تجمعها الديمغرافي.

ثانيا، حددنا نماذج النمو والأسباب المحتملة للنمو وتفسير النمو على أساس شكل الشبكة الحضرية والبيانات الاجتماعية والاقتصادية المقدمة في وثيقة التخطيط الإقليمي. SRAT.

وأخيرا، قدمنا تعريفا مكانيا للشبكات الحضرية الثمانية حيث اقترحنا نماذج النمو المناظرة للشكل الحضري للشبكة ونستشهد بالأسباب المحتملة لذلك الشكل استنادا إلى الدراسات السابقة والبيانات المتاحة.

الكلمات المفتاحية: النمو الحضري، إمكانات التنمية، التخطيط الإقليمي، الشبكة الحضرية، التكامل الحضري، التطور الديمغرافي، الجزائر.

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1. INTRODUCTION

Urban growth was not a modern problem to be solved by a certain technique or technology, it became a phenomenon, an established reality that we must deal in order to master future planning strategies.

Throughout the academic literature, in discussing urban growth and urban sprawl, we tangle a very thin line of differences, the clear vision of both phenomena in the same area require a definition of limits, models of growth and causes of growth, declaring those elements will present a solid background into a successful urban planning strategy.

From a historical point of view, Rome was the first city to reach a population of one million and be the subject to a series of Imperial edicts limiting its growth, concerns about the size of cities continue as it grows throughout history, for example, in London of the 16th century, the notion of some sort of cordon was proposed to protect the countryside and to stop the plague (Morris, 1994).

However, the industrial revolution that began in the mid-18th century was the starting flame of the modern explosive growth from the core to the edge, the dominant force in cities growth was defined as the polarization of the three resources: land, labor and capital. (Batty, M, Besussi, E, & Chin, N, 2003)

In the 19th century, agriculture was abounded in favor of the economic prospects of cities; those cities became exchange points where industries and services that are close to each other prosper to be clusters¹. (Batty, Besussi & Chin, 2003)

Studies about the causes and the consequences of urban growth began to move away from geographic approaches to economic, social and multidisciplinary visions of the issue, many theories have tried to explain or describe this phenomenon.

the concept of central places was presented in the work of (Christaller, 1966), he argues that the spatial and hierarchical relationships between urban centers reflect the play of economic forces, and that large centers are the seat of many economic functions, while small centers possess only a few.

Nevertheless, this concept needs a balanced situation, a filled region in an equilibrium position, it is impossible to know how the system will react to some change such as a modification of population density (Ex: rural exodus), or a transport innovation, so as a theory, it shows a relative shortcoming in dealing with urban dynamic revolutions. (Batty, M, Besussi, E, & Chin, N, 2003)

(Garrison, Berry, Marble, Nystuen, & Morrill, 1959) introduce the rank-size rule: When urban centers interact, towns and villages started to gradually be brought into interaction with each other, as a result of the economic competition, causing some to grow and others to decline.

It has been observed that there exists a certain regularity in the relative sizes of those urban centers remaining in interaction within a region.

¹ Cluster: geographical concentration of interdependent enterprises: suppliers of goods and services in close industrial branches. (Ressources de géographie pour les enseignants : Cluster, 2020)

In the 1970s, we witnessed what appear to be a clean break in the cities, the de-concentration that took place is simply a consequence of the fact that the most obvious locations for new development are in the suburban fringe. (Batty, M, Besussi, E, & Chin, N, 2003)

Since that, many studies discussed the urban sprawl problems from multiple angles, identifying its causes or stimulating its future growth or declaring its familiar patterns, in this paper, we feature three interesting classification studies of causes of urban growth (Bierens, H. J & Kontuly, T, 2008), interpretation of the growth of the network form (Docampo, 2014) and models of growth (Galster, et al., 2001).

We ask a very simple but crucial question for future studies on urban growth in any chosen region: what are the models and the causes of the actual urban growth or sprawl? To answer this question, we need to identify the urban networks of all wilayas in our region based on the demographic and historical data presented in the official documents of regional planning such as SRAT and SDAAM and on the latest population census RGPH of 2008.

We conducted a thematic analysis of urban networks using a deductive and semantic approach, we start by creating the urban network of each wilaya based on the size of its agglomeration, then we identify their models of growth, the possible causes of growth and the interpretation of growth based on the urban network form and the data presented in the regional planning document the SRAT.

The main purpose of the paper is to classify the urban network of the 8 wilayas in the north east region of Algeria based on the models of growth presented in the work of (Galster, et al., 2001), on the causes of growth on the work of (Bierens, H. J & Kontuly, T, 2008) and the interpretation of growth of the urban network form (Docampo, 2014).

The remainder of the paper is organized into three sections:

Section 1 illustrate the literature review behind the article's main issue and the theoretical frame of the study where we explain the phenomenon of urban growth, section 2 is devoted to the case of study and the data of each wilaya, Section 3 summarizes the results of the study and the conclusion.

2/Phenomenon of urban growth

At the end of the 20th century, urban growth has pushed cities further and further out, referring to that we quote (Storper & Manville, 2006) : "The cities were the jetsam of another age, vertical settlements in a horizontal world, and artifacts of a time before distance died. They were not where people wanted to live and were no longer where they had to work".

Urban growth was not a modern problem to be solved by a certain technique or technology, it became a phenomenon, an established reality that we must deal with in order to master future planning strategies.

2.1/Growth VS Sprawl

Sprawl (as the low density form of urban growth) started increasingly in the 1970s, when cities began to get bigger it expands around their peripheries some times in an unorganized

way, this sprawl was mainly for the reason of high central density in the original agglomeration and the development of better transportation systems which made it easier and in a daily bases.

Urban growth occurs due to forces where sprawl can be identified as unintelligent growth, compactness in the peripheries usually suggest the existence of an urban policy that has been implanted. (Batty, M, Besussi, E, & Chin, N, 2003)

Sprawl can simply be identified as uncoordinated urban growth (Batty, M, Besussi, E, & Chin, N, 2003), (Whyte, 1958) argue that sprawl brings bad economics explaining that the costs of sprawl on the economic growth of the agglomeration is usually a negative impact where (Glaeser & Kahn, 2004) stated a contradictory theory that sprawl can generate profits when it beaming followed by jobs and capital flows.

As a simple, yet clear description of the modern urban growth, (Glaeser & Kahn, 2004) stated the following hypothesis into approaching the urban growth phenomenon:

- Jobs followed the people: in planning metropolitan areas, decentralized homes usually need decentralized jobs.
- The main cause of the actual sprawl is “the automobile”: whether it is Suburbia or edge cities, sprawl is the natural, result of the technological advancement in the dominance of the automobile.
- Sprawl’s negative quality of life impacts have been overstated; in the most cases, the growth of edge cities is associated with increases in most measures of quality of life.
- “The problem of sprawl lies not in the people who have moved to the suburbs but rather the people who have been left” (Glaeser & Kahn, 2004): The exodus of jobs and people from the inner cities have created an abandoned underclass whose earnings cannot support a multi-car based lifestyle.

2.2/ Causality of urban growth

Explaining the causes of urban growth usually is made based on a historical, chronological study of a certain area through time, but several studies have proposed general causes that could lead to future urban growth (or sprawl) based on multiple factors, (Bierens, H. J & Kontuly, T, 2008) summarized the causes of Urban Sprawl into five categories:

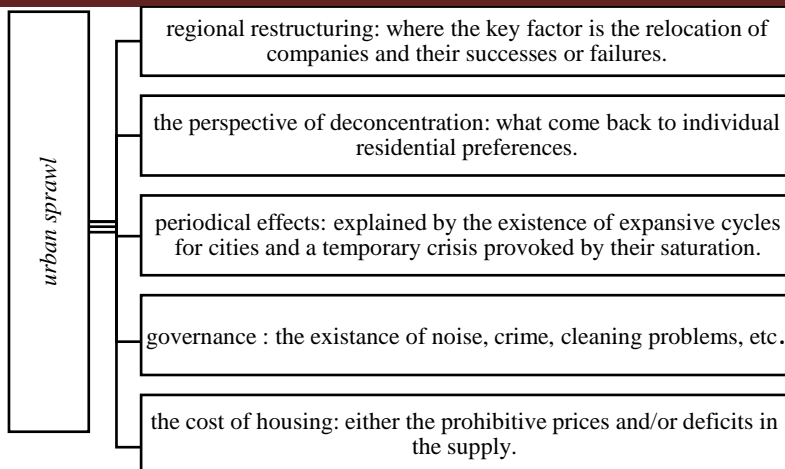


Fig.1: the major causes of urban sprawl

Source : Bierens, H. J & Kontuly, T, 2008.

On the other hand, (Docampo, 2014) divided the descriptive interpretation of growth into two groups of answers:

Continuists (or evolutionists): in this group the deconcentration that took place is a change on the territorial scale; the city maintains its living dynamism but includes territories (urban areas) that go beyond the perimeter of the “continuous-compact” to include both spaces in “low density cities” and housing developments in denser estates.

Rupturists (or revolutionaries) Rupturists emphasize on the fact that something relevant has changed and that cities have lost their historical hegemonic role in favor of more dynamic new locations; we are faced with a “new cycle,” which arises out of the end of a previous stage.

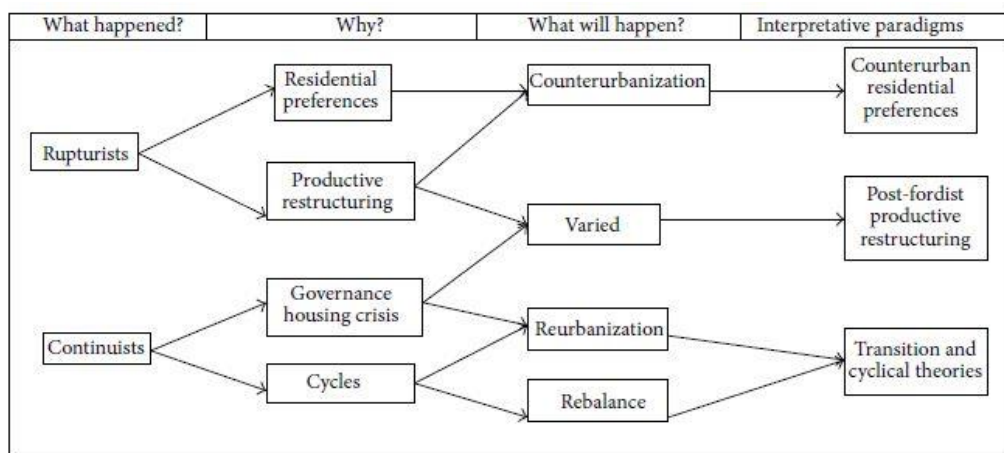


Fig.1 : interpretive logic of urban sprawl

Source: Docampo, 2014

2.3/ Modeling urban growth

The control of urban growth became an ancient paradigm, nowadays, stimulating the pattern of growth is considered the key to a successful planning strategy, many studies have shown models of growth in an attempt to suggest regional planning strategies based on suitable and desired growth.

As an example, we consider the work of (Batty, M, Besussi, E, & Chin, N, 2003) based on (Galster, et al., 2001) classification of the urban growth based on the density and spatial form (table 1)

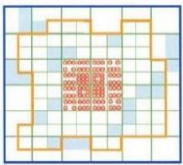
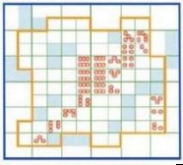
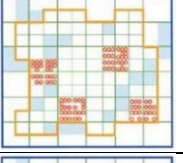
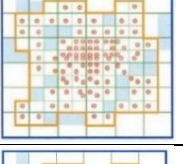
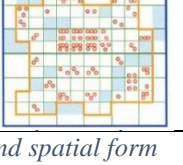
	High Density	Low Density	Graphical presentation
Compact Contiguous	Circular or radial using mass transit	Possible but rare	
Linear Strip Corridor	Corridor development around mass transit	Ribbon development along radial routes	
Polynucleated Nodal	Urban nodes divided by green belts	Metro regions with new towns	
Scattered Discontinuous	Possible but rare	Metro regions with edge cities	
Leapfrogging Development	Possible but rare	vacant or non-urban land and uncoordinated investments	

Table 1 classification of the urban growth model based on the density and spatial form

Source: (Galster, et al., 2001)

2.4/ The concept of urban networks

When discussing the urban network concept, (Ducruet, 2020) declares the existence of dispersal of approaches and definitions, multiple scales of analysis, disciplinary perspective, and intended audiences.

The crossing between network science and urban studies made it possible to consider urban networks as where cities are nodes or vertices and their mutual connections are links or edges (Derudder, 2019)

The academic spectrum features the city network concept differently, from city network, city system, system of cities, urban system, where the variation among existing studies comes from three main elements:

- The scale of analysis adopted
- The urban processes captured
- The ontological status ascribed to the
- Network under study.

Theorizing the urban network, lead to a wide diversity of definitions and empirical studies, defining the concept of urban network implies a certain degree of interdependency among cities that are connected by various linkages at different spatial scales where mostly in hierarchical tendencies the larger cities are first adopters before redistribution to smaller cities.

3/ The north east region of Algeria²

The North East of Algeria is a privileged region with a strategic geographical position at the crossroads of the axes connecting the Maghreb countries, the Maghreb and Africa to the Mediterranean (North-South Euro-Mediterranean axis), a strategic location that gives it an international vocation natural. Its geographical position also places it at the heart of transport networks (international airports, ports, motorway and railroad) and centers of interest and decision-making; it owns two national metropolises and the second region in terms of industrial jobs (especially public).

This region is both coastal and inland, borders Tunisia, and the eastern and central highlands regions, the regional urban structure is marked by the role of the two metropolises of Constantine and Annaba and by the presence of four cities of more than one hundred thousand inhabitants: Skikda (170,000 inhabitants) Jijel (147,000 inhabitants) Guelma (110 000 inhabitants), Souk Ahras (107,000 inhabitants).

The north-eastern region is the most crowded with 209 inhabitants per km² twice as dense as the north-center and the north-west.

3.1/ The structure of the regional space in the north east region

The distribution of cities in this region corresponds globally to that of natural resources, thus; the coasts are urbanized from the main port sites: Jijel, Skikda and Annaba are the outlets towards the sea, Constantine, Mila, Guelma and Souk-Ahras are in the center of the main agricultural areas of the region.

If we examine the territorial distribution of agglomerations larger than 25,000 inhabitants, the Northeast region appears as a de-structured territory with a central space, articulated

²All the details provided in this section is from the official documents of the SRAT and SDAAM of both Constantine and Annaba and from the statistics published in the RGPH 2008, which is considered the last official statistics published by the government.

Source : Urbaco & ANAT, (2005-2010)

around the RN5, RN3 and RN44 linking Algiers to the Tunisian border and between the two poles of Constantine and Annaba.

(Raham, 2001) argue that the industrial investments made by the State from the 1970s is the main factor in de-structuring regional space, by wanting to get closer to the populations and the workforce, were established in the middle of the best agricultural lands and created the bases for a continuous de-structuring of the rural world through the competition that industry maintains with agriculture on land, water and labor.

The second factor in the de-structured regional space is schools and health facilities in major towns: it has drained in large numbers the rural populations surrounding the cities and even urban populations from other cities in the region or outside and less well provided with socio-collective facilities.

Finally, the last factor, which has appeared in recent years, the insecurity of the countryside, which prevailed during the decade 1990-2000 largely, contributed to the re-composition of the urban reality.

the migratory movements of the decade of insecurity (1990-2000) largely explain the current urban structure and for the future, new logics seem to be put in place based on the economy (formal and informal), and on major university facilities in particular, tend to stimulate new urban dynamics; the major housing programs initiated by the state also played a large part in the reshaping of the regional urban structure. (Raham, 2001)

3.2/ Distribution of small and medium cities in the north east region according to demographic structure

Compared to the national level, the demographic dynamics of the Northeast region were increasing at a much slower rate than that observed at the national level (RGPH 1998 and RGPH 2008). The observed gap is mainly linked to the massive exodus of rural populations to urban areas, particularly to large cities and metropolises (confirmed by the age structure of the under-equipped mountainous wilayas - Mila and Jijel - and that of the wilayas. well-equipped and with high industrial potential)

Examination of the distribution of agglomerations by size shows that if, overall, all categories are represented in different wilayas:

	> 100.000 inhabitants.	50 à 100.000 inhabitants.	20 à 50.000 inhabitants.	10 à 20.000 inhabitants.	Total inhabitants.
Northeast region	1 300 575	171 269	496 927	473 934	2 442 705
	53,2 %	7 %	20,4 %	19,4 %	100

Table 2 the distribution of agglomerations in the north east region

Source: RGPH General Population and Housing Census, 2008.

Wilaya	Population in 2008	Surface km ²	Density (inhabitants/km ²)	Rate of demographic growth
Jijel	379156	2577	266	3.94
Skikda	516617	4 026	223	2,37

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Annaba	512411	1439	424	1.30
Guelma	300679	4101	118	2.13
Constantine	836977	2 187	427	1.73
El Tarf	240697	2 912	122	2.87
Souk Ahras	256963	4 541	95	3.03
Mila	446939	9 375	220	4.52

Table 3 Demographic data for the wilayas of the north east region

Source: Author's elaboration from RGPH 2008.

3.3/ Territorial planning documents: the state's tools to control urban growth

The State undertook a major territorial planning project through the development of the National Plan and Regional Land Use Planning Schemes in the 2000s (SNAT, SRAT), by making this choice, it intended to set up a structure for the coherence of the development of territories, stimulating the necessary changes in economic matters and providing the infrastructures essential to this development, while being respectful of the major natural balances in a perspective of sustainable development.

That work was for the objective of opening the country economically, the challenges of human and social development and better management and governance of decisions and resources at a local level.

Through these documents SRAT³ SDAAM⁴, spatial planning engineers aim to bring to the light the importance of cities, especially the largest of them, as major lifts for development and global economic competitiveness.

The reconfiguration of the urban structure, the qualification of the metropolises of the region, the requalification of the urban fabrics, the upgrading of the infrastructures as well as the networking of the actors' poles (companies, universities, training center, local communities, etc.), were the main objectives that the SRAT North-East of Algeria, it was addressed to achieve the construction of a 'knowledge-based economy' for its eight wilayas of Jijel, Skikda, Annaba, El Tarf, Souk Ahras, Guelma, Constantine and Mila.

It is in this context that the Master Plans for the Development of Metropolitan Areas (SDAAM) of the four major national metropolises (Algiers, Oran, Constantine and Annaba) were also initiated, the objective of which is to provide the reference territory with a strategic vision, to allow more effective targeting of public action, as well as alignment of sectoral policies.

As such, the SDAAMs were established taking into account "the area of influence of large agglomerations", this being defined as the territory to be considered to control and organize the development of the metropolis.

3.4/ The scenario of territorial rebalancing and settlement

³ SRAT : Schéma Régional D'Aménagement du Territoire (Regional Spatial Planning Scheme), ANAT, 2005.

⁴ SDAAM : schéma directeur d'aménagement des aires métropolitaines (master plan for the development of metropolitan areas). Urbaco, 2008.

Among the four scenarios established in the SRAT for the north east region, The scenario of territorial rebalancing and settlement is the only one favoring the urban growth of all 8 wilayas. (SRAT, 2008)

This scenario is based on the voluntary implementation of attractive conditions from populations to the Highlands and major regional projects, speeding up the process of integration into the urban metropolitan areas would allow accelerating development in other areas.

3.4.1/ Objective for the urban world:

To establish the goals of this scenario the region will have to promote a more structured and better urban network, served around the two metropolises Annaba and Constantine for which it is necessary planning of Maghrebian and Mediterranean vocations.

This strengthening of the areas the metropolitan areas of the region must be carried out simultaneously with the opening up and networking of urban poles throughout the North East region especially those surrounding the mountain areas (western area of the region in particular).

In this scenario, we notice a desire to confirm Annaba and Constantine as national metropolises; by the restructuring of their respective metropolitan area and the upgrading of its industrial fabrics, the modernization of its infrastructure and the promotion of economic supply based on higher tertiary services and of excellence.

3.4.2/ Objective for the rural world:

the concerns of the rural world (mountain in particular) are taken to maintain an active population in the context of an endogenous development linked to the natural resources and vocations of the different territories that make up the rural world (agricultural and agro-industrial activities, forestry, eco-tourism, etc.).

For this, the role of infrastructure is paramount to reduce disengagement and promote the economic activities of these territories.

This scenario also discusses the safeguarding of natural environments and protected areas; the north-east of the country being the richest region in terms of natural parks and protected areas.

3.5/ The north east wilaya's description in the official documents

the diagnostic of the region in the official documents could be resumed as accelerated and anarchic urban dynamics marked by the proliferation of precarious housing, a high rate of unemployment, absence of productive investments and underuse of existing infrastructural capacities, namely port-airport-railroad-sorting station.

“In general, large cities are faced with major problems in controlling urban growth and land. In this context, small towns (20,000 to 50,000 inhabitants) could constitute an alternative for their postponement of growth.”⁵ With these sentences declaring the reason, the perspectives for each wilaya in the SRAT and SDAAM of the two metropolises Annaba

⁵ SRAT regional spatial planning scheme, tome 3, URBACO, 2005.

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and Constantine were given in a slightly general method without an exquisite definition of scale or communal structure.

The eight wilayas were treated as administrative units with no regard to their spatial dynamics on demographic structure; in the following table, we summarize the description and goals for each wilaya in the north east region:

Wilaya	Regional function	Urban Potentials	Rate of urbanization (1998-2008)	Number of municipalities with negative rural growth rate/ total number of municipalities	communal predominance
Jijel	Link city to the center	Ports and infrastructures, its industrial zone.	61,1	19/28	Rural
Skikda	A support to the metropolitan complementarity	a petrochemical industrial hub of international importance and fishing ports of regional importance	57,4	15/38	Mixed
Annaba	Mediterranean metropolis	economic potential (mainly industrial) and upper tertiary equipment	84	2/12	Urban
Guelma	Link city to the Tell and hinterland to Annaba	Absence of a clear role in regional development or method to promote endogenous balance in the communal system of the wilaya	62	10/34	Rural
Constantine	Regional metropolis	tertiary and administrative functions and an important industrial fabric	89,1	4/12	Urban
El Tarf	Hinterland to Annaba	natural environment	58,9	5/25	Mixed
Souk Ahras	Link city to the Tell and hinterland to Annaba	Historical advantages	58	14/26	Rural
Mila	administrative command	rich agricultural potential and a new industrial	58,2	22/32	Mixed

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	of its agricultural territory and hinterland to Constantine	development			
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Table 4 Mentioned points about the wilayas of the north east region in official documents SRAT and SDAAM Source: Author's elaboration

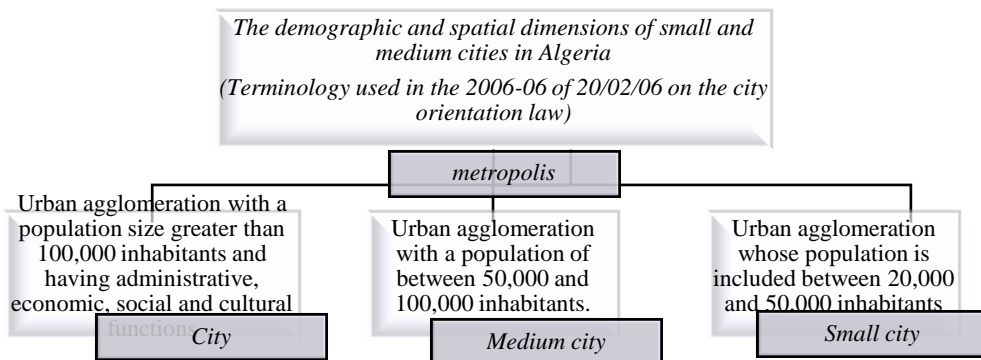
To be noted that in the SRAT there was a clear mention of Annaba sprawl causes, the development of the industrial fabric has led to the saturation of the urban perimeter and the uncontrolled development of its urban sprawl.

The SRAT also addresses the problem of soil stability that Mila's suffer from, a vulnerability that can result in a landslide in the land, it needs to be the subject of specific treatment so the postponement of growth could be carried out in the direction of Oued Othmania and Chelghoum El Aid and away from the principal city in the wilaya of Mila.

Ps: the new city of Ali Mendjeli was not mentioned because it did not excited in that time.

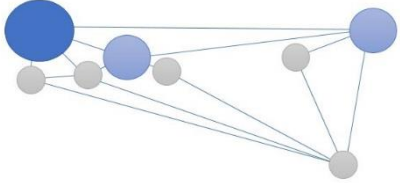
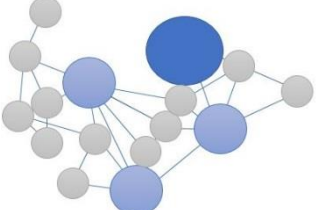
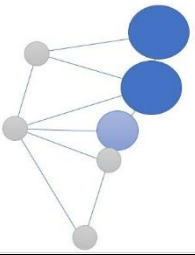
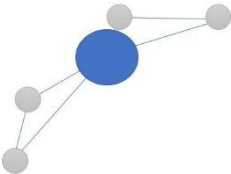
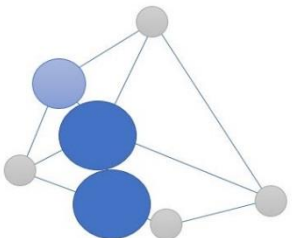
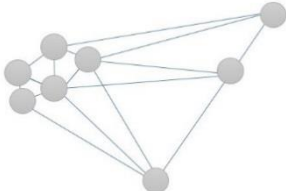
3.6/ The urban networks in the north east region

In modeling the urban networks of the north east region, we refer to the classification of cities cited in 2006-06 law of 20/02/06 on the city orientation, we present the urban models of representation of different dimensions of agglomeration. (table 4)



Wilaya	Number of Big cities	Number of Medium cities	Number of Small cities	The actual form of the urban network
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Jijel	1	2	5	
Skikda	1	3	12	
Annaba	2	1	4	
Guelma	1	/	4	
Constantine	2	1	4	
El Tarf	/	/	8	

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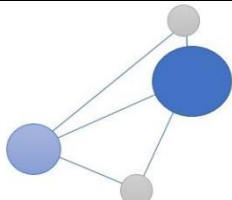
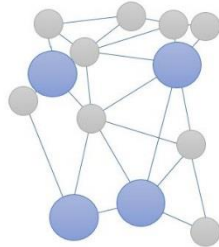
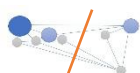
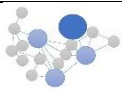
Souk Ahras	1	1	2	
Mila	/	4	10	

Table 5 classification of the wilaya's agglomerations in the north east region based on official demographic dimensions

Source: Author's elaboration of RGPH 2008.

At the observation of the previous table and objectives for the region, we noticed first that the wilaya of Skikda and Djijel with the biggest number of small cities that as usually an indicator of agriculture or touristic allocations is programmed as a future industrial pole, in second point we notice the two metropolises dispose of several small cities which if integrated to the right development strategy can produce future urban centers.

4/ Results of the study

Wilaya	The urban network	Interpretation of growth ⁶	Possible Causes of growth (or sprawl) ⁷	Model of growth ⁸
Jijel	1  2	1 continuists 2 rupturists	1 periodical effects (or/and) governance 2 the perspective of deconcentration	1 linear strip corridor 2 scattered discontinuous
Skikda		Continuists	the perspective of deconcentration (or/ and) regional restructuring	Leap frogging

⁶ Figure 2 : interpretive logic of urban sprawl (Source: Docampo, 2014)

⁷ Figure 1: the causes of urban sprawl (Source: Bierens, H. J & Kontuly, T, 2008)

⁸ Table 4 classification of the urban growth model based on the density and spatial form (Source: (Galster, et al., 2001)

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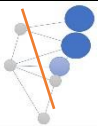





Annaba	1 2 	1 ruptirists 2 continuists	1 the perspective of deconcentration (or/ and) regional restructuring 2 governance (or/and) the cost of housing	1 linear strip corridor 2 polynucleated nodal
Guelma		ruptirists	the perspective of deconcentration (or/ and) periodical effects	Scattered discontinuous
Constantine	1 2 	1 continuists 2 ruptirists	1 governance (or/and) the cost of housing 2 the perspective of deconcentration (or/ and) regional restructuring	1 linear strip corridor 2 polynucleated nodal
El Tarf	1 2 	1 continuists 2 ruptirists	1 the perspective of deconcentration (or/ and) regional restructuring 2 the perspective of deconcentration	1 polynucleated nodal 2 linear strip corridor
Souk Ahras		ruptirists	the perspective of deconcentration	Scattered discontinuous
Mila	1 2  3	1 continuists 2 continuists 3 ruptirists	1governance or regional restructuring 2 1governance or regional restructuring 3 the perspective of deconcentration	Leap frogging

Table 6 the classification of urban networks of the north east region

Source: Author's Elaboration

5/ discussion of the results

As an overall observation, we notice a variety of urban networks in the north east region of Algeria, which usually indicates the existence of several factors of growth with differences in time and scale of each agglomeration in the network:

Jijel: we can identify two separated forms of networks the first was is more compact which indicate a continuists growth in the linear strip corridor model, the reasons behind that could be periodical effects (the rural exodus in the decade of the insecurity 1991-2000) or/ and governance issues that took place in dealing with that population density change.

The second one is on a ruptirists form, a scattered discontinuous model that probably took place before the rural exodus due to the perspective of deconcentration (personal preferences)

Skikda: the urban network in skikda is compact with a variety of scales, which suggests continuous growth; even though the wilaya suffered from insecurity in the 1990-2000 decade.

The morphology of the wilaya is also a factor that could slow down the growth but on contrary, it kept a continuous rhythm driving us to wonder about the rate of consuming agricultural lands and the natural environment in the wilaya.

Annaba: in the case of Annaba metropolis, we observe 2 detached models in the network, the first one is more of a hinterland, a polynucleated separate nodals of small cities. The second one is the conurbation of two big cities in a linear strip corridor with medium and small cities in their periferes.

For the first one, the causes could be multiple from regional restructuring (projects initiated by the state in heavy industry) to the perspective of deconstruction; the second one, governance issues or cost of housing in the cities are probably the cause of growth.

Guelma: the network of Guelma (along with Souk Ahras) is the smallest (in terms of elements number), it is also the only one with no medium city, the growth is ruptirist, a scattered discontinuous model of small cities that has grown from rural agglomerations due to periodical effects.

Constantine: the second metropolis in this list is Constantine where we also can distinguish two networks, the first one is a continuist growth in a linear strip corridor with a conurbation of two big cities.

Usually, the causes for such growth are governance issues or the cost of housing in the metropolitan area, the second one is two detached small cities forming a ruptirist growth where the cause of growth is the perspective of deconstruction, the exodus from the neighbouring agglomerations.

El Tarf: this wilaya has a unique network, with the absence of big and medium cities, there are only small cities in this network, we notice two separated groups: the first is polynucleated nodals on the borders of other wilayas in a continuist growth model.

The second one is a ruptirist growth forming a linear strip corridor parallel to the Tunisian borders; the possible causes for this growth are the perspective of deconstruction based on personal preferences.

Souk Ahras: the wilaya has a simple network with a representation of the three dimensions of agglomerations, a ruptirist growth on a scattered discontinuous model probably due to the perspective of deconstruction from the small agglomerations to the nearest bigger ones.

Mila: In this complex network, we notice three units; two in the north and one in the south, the two in the north are compact continuous growth where the southern one is a ruptirist growth, a scattered discontinuous model.

The causes of similar growth go back in general to the perspective of deconstruction from neighbouring wilayas to or from the detached model.

6/ Conclusion

In these modern times, we need locational control, coordinated investments, an alternative means of transportation; all those elements should come together in parallel to solve the congestion problems and increase spatial accessibility (Batty, M, Besussi, E, & Chin, N, 2003) to achieve those factors, a clear identification of models and causes of growth should take place in the first position.

Controlling urban growth by green belts and cordons that dominated the 19th and 20th centuries is now considered a shortsighted vision that should be replaced with a more intelligent approach, maintaining the role of the car in transportation and focusing on enhancing the performance of the urban network.

In our study, we managed to create urban networks for the 8 wilayas in the northeastern region of Algeria based on the dimension of agglomerations and their geographical location. Therefore, the identification of the networks was based on 3 recent studies, we declare the possible causes, interpretation of growth and models of growth.

As a result, we notice major differences between the 8 networks from complex ones such as Skikda to simpler ones like Souk Ahras, the growth in most networks was ruptirist specially in the least populated wilayas, some networks (Ex: El Tarf) showed the absence of one or two dimensions of agglomerations.

The wilaya of Mila is the most detached network with 3 noticeable separate units, each one has its form and model of growth.

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