Automation of the spatial indicators and the sustainability of regional planning

Ammar Khalil Ebraheem

1University of Baghdad, Center of urban and regional planning for postgraduate studies, Baghdad, Iraq

Abstract. They are many changes have been done in the spatial analysis work, by developing techniques and mathematical models, especially after rapid development in spatial information technologies, like GIS, GPS, an Remote Sensing, all previous discussing gives planners new capabilities through controlling on space and place variables, and how they can interpretation these variables as systems with relationship among them, with its huge numbers of elements. These technologies developed new kinds of indicators related to spatial dimension; these indicators take in it is values the weight value of location, so it represented more actual calculated value for location.

Research are selecting Holy Najaf Governorate to be it is case study, and to get spatial indicators can help to directed spatial development strategy for making spatial structural plan for governorate. We use cells analysis through potentiality analysis as one of simple spatial techniques can give us interesting spatial results, also the case study having variety and separated assets and resources, so the applying technique give us important results, like, there are no important or leader elements for developing process, but these will be done through actual exist for spatial potentiality, also, according to adapted policy by local governorate, in this case we are can putting different priorities depending on spatial capabilities for spatial development.

1- Introduction

All manuscripts must be in English, also the table and figure texts, otherwise, we cannot publish your paper. The research problem lies in the weakness of the clear mechanism through which the latent development potentials in the regions are determined, through which the level of disparities appears between the parts of a single province, which negatively affected the identification of spatial development mechanisms, the elements of their formation, and the degree of their association with their spatial space. But to overlook the spatial development priorities, and focus only on the priorities of sectoral development projects, which has led to this clarity on the weakness of the structural plans in determining the spatial development priorities.

So the study aims to highlight the role of spatial characteristics as a developmental reality in determining the priorities of development trends, to build structural plans for spatial strategic development, which requires determining the levels of correlation and dependence between spatial plans and development of all kinds, after analyzing the elements affecting the process of preparing structural plans for this, the research will seek to clarify the most important The indicators that define development priorities, finding a method used for that purpose, as well as creating a theoretical information base that addresses the basic concepts associated with structural plans and development.
for the purpose of clarifying concepts related to structural plans and development, and identify its elements and indicators.

The question will be: How effective are structural plans in achieving development, and does this depend on the components that make up them? What is the effect of each of them on the other, what is the relationship between structural plans and development in all its forms, what are the foundations and elements that constitute the structural plans, and how can they achieve the goals of spatial development.

2- Dialectic of the place and control of its behavior

One of the problems that were dealt with as an axiom of Western thought regarding the place is that it is a measured dimension with a rational system, but the intellectual reality that the spatial plan faced is otherwise, since the place is greater than being a pre-measured system, because the social factor defines the human being and his needs and is the operator who exploits the place and adapts it according to its different human benefits, will make the place a hierarchical system for several variable systems subject to real-time monitoring and standardization. Thinking within the second direction made the place a variable and measured dimension at the same time, which is an expression of the complexity of the system of interactions that govern the place through social and economic relations that work to form the place of the place, and this is variable with time, on the one hand, and with the nature of society on the other. This allowed the spatial plan to resort to modern methods that enable it to measure the largest possible number of spatial variables to infer the interrelationships that collect these variables and form the space authority, (Skordoulis, 2008, p105).

The phenomenon of quantization of planning and controlling it through its rationalization was a purpose in order to optimize the utilization of available resources and revealing of the development potentials in connection with building socio-economic development plans that raise societies and reduce the burden that occurred after the Second World War, but what this phenomenon overlooked is Exaggeration in muzzling everything down to human behavior, which rose up with a new intellectual movement that fought the principles and declared that every place and time has its constants and its variables and thus its behavior, meaning that the planning view of the development potential of any place is itself changing with the nature of society and level Its economic, which led to the search for new methods for the analysis of spatial freedom launches scheme to develop plans under the spotlight on all the developmental potential of the place, (Allmendinger, 2002, p5).

So the key to preparing a spatial structural plan will be by relying on a focus on the economic dimension of the potential development latent, and not actually being exploited, with the aim of actually renewing and creating creative space for the place. Attempting to attract investment within the infrastructure structures, whether technical or social, as it consumes financial resources and a pillar of development at the same time, it cannot be activated by relying on government spending only, therefore the spatial structure will suffer from the class disparity between rural and urban. Looking at the developmental potential of the place with different spatial scales, complementary to each other, continuously and non spatially separated, (MORPHET, 2011, p238).

3- Field of study

We can define the most important spatial indicators that clarify the most important developmental joints that affect the priorities of spatial structural, and the formation of the concept of spatial development in it. The research was able to organize these indicators with five main groups:

1. The Economic Group:
It is the group that included all economic and heterogeneous elements in its spatial distribution within the study area, namely:
The priorities of the sectors comprising the structure of the governorate's economy, the contribution of economic sectors to the GDP, and the average monthly income.

2. Housing and Housing Group:
This group included the percentage of the economically active, the specific ratio of the population, the number of employees, the size of the rural population, the size of the urban population, the number of
rural settlements, the number of urban settlements, the occupancy rate of housing units, ownership, population density, types of housing, and housing patterns.

3. The Transport and Communications Group:
Including a diverse road network (regional, express, female, ....), transport garage, railway station, civil airports, vehicle ownership, and freight stores.

4- Bearing Structures Group:
These include schools, universities, hospitals, water networks, and electricity networks

5- Environmental group:
The presence of environmental resources, natural reserves, and indicators of environmental sustainability, functional dominance of the environment (religious, industrial, etc.)
The research attempted through the main groups and their sub-elements to cover the most important variables affecting the spatial development priorities that emerged through the theoretical framework. To be able to establish a practical base for the analysis of the spatial environment of the study area.

4- Data collection
The data sources feeding the study variables information consisted of two basic types:
1. Statistical data
2. Quantitative data.

5- Database and analysis method
After the data for the study area were available, and as it was distinguished by a large size and capacity in detail, by reviewing the available and possible analytical methods, the research chose the GIS method to process and analyze this data, especially regarding that this method relates to the flexibility it provides in dealing with the spatial dimension. And what it contains from different vocabulary, which encouraged the research to seek the technical expertise available in the field of GIS and employ it from research in the service of the research goal.

The construction of the research database is directed at two levels:
1. The first level: It includes linking all available statistical data at the level of administrative units to the smallest administrative unit, which is the area, such as population, income, and others. Thus, a metadata database was available at the administrative unit level.
2. The second level: As a direct result, there is no fixed rule for spatially distributing forms and areas of administrative units, so we find that there is vast data between these units in terms of area and shape, which makes it difficult when conducting any distribution, or spatial standardization, so the research is directed to (Using the development potential analysis) by dividing the study area into a square network with an area of (25 km2) per square by adopting that the area of the largest city with its backs does not exceed this area, and so that the development potential of cities is not fragmented, which may cause a disruption in the analysis.

6- Data analysis
By reviewing the aim of the research in arriving at a determination of the priorities for spatial development, and determining the elements through which a kind of balance and control can be achieved by directing spatial development according to the specificity of the study area. The reason that the study area was lighted on to test the possibility of spatial communication and seeing functional interaction.

And because this requires offering trade-offs between elements and groups in the form of weights, and because of the accuracy and objectivity of determining these weights, which depend on theoretical and practical experience at the same time, the research sought to move away from the subjectivity, and put the weights in the form of a questionnaire for the local planning leaders in their academic and scientific classes.
7- Questionnaire idea
It is to take advantage of the accumulated technical experiences of experts in the field of preparing structural plans and those interested in researchers and academics in the field of spatial development. Questionnaire objective:
Getting rid of the subjectivity of placing the weights from the researcher and relying as much as possible on the neutrality of the subjective research by adopting the average weight of the experts put in question.

8- Method of preparing the questionnaire
The questionnaire was prepared in the simplest form only, just to achieve its goal, which is to neutralize any potential subjectivity in obtaining the weights of elements and groups. The elements affecting the development of the place and its formal composition were divided into four groups, in which the theoretical framework was relied upon in order to form the joint functional relationships between the elements to form Major groups have.

| Table 1. The totals and their weight multiples |
|-----------------------------------------------|
| Group                                | Hierarchy | the weight |
| Economy                              | First      | 6.7        |
| Population and housing               | Second     | 13.4       |
| Transport                            | Third      | 20.1       |
| Pivot structures                     | Fourth     | 26.8       |
| The environment                      | Fifth      | 33         |
| Total                                |            | 100        |

| Table 2. the hierarchy of the elements of the first four groups and their double weight |
|----------------------------------------------------------------------------------------|
| The first group (economy) Hierarch y weight | The second group (population) Hierarch y weight |
| First group | Second group |
|------------------------------------------------|------------------------------------------------|
| The rate of economically active 1 1.3 | The priorities of the sectors that make up the province's economic structure 1 16.7 |
| Number of employees 2 2.6 | The contribution of economic sectors to GDP 2 33.3 |
| The size of the urban population 3 3.9 | Average monthly income 3 50 |
| The size of the rural population 4 5.2 | 
| Population density 5 6.5 | 
| The specific rate of population 6 7.8 | 
| The number of urban settlements 7 9.1 | 
| Number of countryside settlements 8 10.4 | 
| Housing patterns 9 11.6 | 
| Types of housing 10 13 | 
| Occupancy rate of the housing unit 11 14 | 
| Property 12 14.6 | 

Table 3. the hierarchy of the elements of the fifth group (environment), and their doubling weight

| Elements                                      | Hierarchy | weight |
|-----------------------------------------------|-----------|--------|
| The presence of environmental resources       | 1         | 10     |
| Environmental sustainability                  | 2         | 20     |
| Functional dominance of the environment (religious, industrial) | 3         | 30     |
| Nature reserves                               | 4         | 40     |

9- Use the results of the questionnaire
After the questionnaire achieved the desired goal, which is to determine the order of priorities affecting spatial development by relying on the elements affecting the formation of the place, according to expert opinion, and calculating the corresponding weights for each of these groups and elements, and it became possible to find the final weight of each of these elements spatially by adopting a weight. The element with the weight of the group in the total value achieved by the element in its affecting spatial space.

10- Practical application
We have used the expertise available in the field of geographic information systems, because the number of variables that have been adopted, and the choice of the method of analysis (analysis of development capabilities) needs to organize information and extensive derivations that can never be accomplished manually easily without relying on a method of quantitative spatial analysis, such as systems Geographical information.

11- Determine the final weights
Through the use of appropriate spatial analyzes with geographic information systems, spatial and descriptive data for each cell were collected from the grid of squares, and then converted all data into quantitative data, in order to facilitate handling and giving them their weights and totals to extract a set of values for each square in the grid, a value representing weight. The box for each of the basic group elements within the questionnaire, and a final value representing the sum of all major groups according to the final weight of the group with the weight of the spatial component approved in the analysis.

12- Analysis of the normative development elements of Najaf governorate
One of the things that has become recognized in the philosophy of regional science is that the presence of motives and justifications that call for the introduction of a regional planning method requires those in this work to define strategic directions that represent a set of goals presented by a specific time period in a specific spatial field, and of course these goals differ in light of the ceilings and interim priorities imposed by the facts of the capabilities provided by the spatial pages of the regions and in the breadth of the spatial field itself, whether it is locally, a secondary region, or a large region, and here comes the regional planning as a necessary response to the requirements of the current reality. N of these regional pages in order to create the best process of development in that region, or
anything else, and in light of the priorities imposed by the imperative presence of the elements of development capabilities without compromising the goals and requirements of people in those spatial levels, and so if the capabilities and challenges are drawn, regional planning can respond To achieve these requirements in a way that achieves the best results by addressing the existing and inherited problems, or which the development movement produces in the future, starting from standing on the reality of the region and the reality of what is present in it from a natural, human or economic development reality, to represent the reality that You will be subject to analysis, and then deduction, or conclusion to the problems of the region or other regions, up to the general national level, by revealing the regional reality of this region, or that to determine the planning work goals that estimate their levels and the nature of their cohesion through the priorities of their presence in the region, and here The role of regional planning and regional strategic, structural, or sectoral plans come in order to achieve the best possible case for using the potential of this or that region so that it does not allow freezing or wasting it, but rather within the limits of rational use that achieves the best possible productivity through various activities While maintaining a balance in the general planning situation of the region’s relationship with neighboring regions, or comprehensive national regional relations that take care of whether planning is within the intra-regional planning, to ensure proper distribution of resources and their use among the parts of the region itself, as well as linking resources and employment opportunities Economic and social development and the environment that the region needs, whose levels impose a state, or facts of development potential, and the priority of its human, economic and natural elements. Another type of planning may be called inter-regional planning when called for. The matter is creating a state of balance between the regions, especially the neighboring countries whose development priorities vary and vary across their spatial pages, such as the imbalance in the levels of population concentration or resources, and this creates a state of inconsistency between these regions.

Here, intervention is required, to define the nature of the directions for regional planning, as some believe that setting practical and scientific directions for regional planning necessitates taking the principle of (what is the basis) for regional planning in accordance with this orientation to focus on economic and social planning as a basis in the light of which the distribution of the sites of different activities and determines their final sizes in Its level of presence and priority remained. There are those who believe that the directions should take place in light of (what is reality), i.e. looking at the different environmental factors so that regional planning takes into account the process of spatial organization (rural and urban), and their different regional requirements, to vary the areas of regional planning and be inclined to natural planning. Here, the first problem facing the regional plan from its outlook for planning will be to focus on what is the basis, or on what is decided by reality? The answer to this question for the concerned in the direction of planning requires answering a question about what type of region is studied, and what are the priorities of its elements and development capabilities through its spatial pages so that the plan finds before it two things in defining the region, the first of which is that all the classifications related to the definition of the region conclude that the region is part of the surface of the earth characterized by a characteristic A specific geography distinguishes it from other parts of the earth’s surface regardless of the shape and area of that part or the type of feature that distinguishes it.

The second issue is that human intervention is the one that gives any region its boundaries by the characteristic that determines its extension by the extent of the spread of that characteristic, or the natural, human or economic properties that would create a function, or several specific functions if the planning resorted to Moving it, so that its spatial field becomes a planning region, otherwise it will be a static geographic characteristic in geography only, and here we look at the planning region as a basis in the planning work before looking at the nature of the orientation in planning, whether it was real or realistic.
Figure 1. shows the weight of the situation in Najaf governorate

Here the planning regions have varied not according to characteristics, but also according to their functions. If there are multiple characteristics that can lead to different types of jobs, as for those who decide these jobs and their level from the region it is their precedent, or the priority of their presence on the spatial pages of the region in a way that allows the planner to be able to engage them in the development work, to achieve the population goals indicated in other words there are two considerations that must be observed In planning work across the planning regions are:

1. The necessity of having a certain volume of natural resources sufficient to invest it as a minimum to meet the needs of the population in that part of the land and that the priority of its presence qualifies it to move towards a required job performance in that region through its spatial pages.

2. That there be in that part of the land (which will be adopted a planning region) a population size capable of providing work forces capable of investing natural resources towards achieving the requirements of the population according to the need. In other words, there should be a population size that works to move the characteristics of the locational features according to their available priorities and by balancing them with the size of their presence from the spatial units and the nature of its distribution over them, and therefore the natural resources of regional administrative or geographic regions that are similar in them from the development capabilities within a certain percentage to reach The standard ratio for them, so the locations of these regions (which bear this characteristic, or that and distinguish them from the rest of the regions outside them) are homogenous region, as the spatial distribution of their environmental phenomena (nature, life, or economic) is the same, and this form These phenomena are attributable to a causal relationship between them, otherwise the different appearances and developmental elements across the spatial units composed of these regions will be a factor in making each of them a functional region that has nothing to do with the other region, but rather the local units are combined for them based on the job flows that come out of those units To reach all units of the region to reflect a degree of interaction rather than cohesion in the region as a whole.

Hence this research comes not to compare the capabilities of the two administrative regions. The difference between them is apparent in the proportions of the elements and the development capabilities, as the Najaf region embraces in the least cases of visualization a functional domination of one of the important economic sectors, which is the religious tourism sector in addition to the other capabilities that can be combined In this region, basic elements have to be taken into consideration in planning the economic and social aspects.

13- Critical path analysis of standard elements

In order to read more clearly the results of the spatial analysis of development elements, the critical path method will be used here, to read the arrangement of data from another angle, and to reveal the facts of the relationship between these elements spatially and developmentally.

The share of each governorate, and what it obtained from these elements, was compiled according to a scheme that is shown in the work progress path through the GP.M critical path.

The factual arrangement of the developmental elements is far from the normative arrangement, as the environmental group was in the fifth and final arrangement, while this group constituted the first
rank in the normative situation, as the population group formed the first rank, which was the fourth in the standard case, and the economic group came in the second order in terms of it was the last and fifth rank in mind, or standard position.

There is a convergence between the normative ratios of the second pivotal services group, and the third transportation services that earned the second and third ranks in the standard arrangement versus the third and fourth position of the community of development elements in the reality of the governorate. This indicates the convergence of the relative importance of the position of these two sectors or groups between normative and realistic.

These findings (GHS Development Analysis and Critical Path GP.M), according to the set of elements adopted by the research, indicate specific results that map the practical directions of regional planning that will depend on adopting development strategies and plans, as well as determining the trends towards any of the policies that it can be adopted to push development elements into development processes.

![Figure 2. Governorate priority (from high to low)](image)

14- Results change critical path
The most important of these results are the following:

1- The difference in the realistic levels of the development elements necessitates a specific priority for these elements. Each of these elements differs upon their inclusion in the development process, that is, the employment of development elements is in isolation from the homogeneous view of the region, as it will depend on the structural scheme of the governorate that adopts contexts (strategies, policies), determining the nature of the interaction between the elements Development and precedence prioritize it, meaning that regional planning will be of an implicit type Intra-Regional Planning, as planning for each region is done according to how it deals with the priorities of the development elements of each.

2- The high percentage and realistic rank of the population and economic elements of Najaf province makes it a functional region in which planning work calls for the introduction of
aspects (social and economic first as basic elements for regional development in this region based on the principle of (what is the basis) so that the regional planning pattern is of an economic, social and natural nature that is Accordingly, it distributes the locations of the various activities, such as stable and economic activities (industrial, agricultural, and tourism) that determine their sizes from each level, their presence and the priority of their attendance.

3- The clarity of the level of priorities and priorities of development elements in the Najaf region, and determining the nature of the planning directions of each of them, requires defining the strategies and policies that will be adopted from each type of implicit regional planning towards maintaining the state of homogeneity that will remain inherent to the state of development work, and that the strategies and policies differ. As the planning deal will remain in the developmental elements themselves.

Here, the research finds that the available strategies will be one of the following:
1. Agricultural strategy.
2. Self-reliance strategy.
3. Self-sufficiency strategy.
4. Manufacturing strategy.
5. Balanced growth strategy.
6. Unbalanced growth strategy.

15- Conclusions

1- There are no important elements, or a leader, that will expressly lead the development process. Rather, these elements are determined according to what is imposed by the reality of the spatial state of development in the region, and according to the policy followed by the state in determining the development priorities of each region.
2- Structural plans constitute the strategic framework for developing regions according to their spatial data, whose indicators should coexist according to priorities determined by the sizes and levels of spatial components of the elements of spatial development.
3- Variation in the weights of the factors that influence determining the spatial priority of development by variance of the region or study area. It is not possible to adopt an absolute weight for any of the groups or elements regardless of location.
4- The technical aspect, to determine the spatial development priorities, is isolated from the decision-maker’s desire, and the decision-maker’s desire becomes clear after the development priorities are distinguished, and are the policies that can be followed while respecting the spatial priorities to exploit the place.
5- Development policies and spatial strategies affiliated with it are a means of applying the concepts of structural plans at the level of governorates and regions.
6- That achieving development in the spatial parts of the functional regions requires that its goals meet with the national development goals by merging the local objectives with the general development goals through fixed or interim mechanisms and policies required by the process of prioritization of the size and level of the elements of economic and social change and the relationships between them.

16- Recommendations

1- It is possible to adopt the methodology developed within the research as a basis, to determine the priorities for spatial development, and to draw the resulting policies, and it is possible to develop the current method after adding new variables that can help to understand spatial differentiation between sites.
2- Taking into account the nature of the policies and mechanisms for each executive stage through the structural plans, and that its election and determining its level of effectiveness depends on the time of each priority during which spatial data are presented as spatial forces required by the process of rearranging the place towards achieving the set goals.
3- The necessity of taking into consideration the specificity of the economic and social forces in the regions when moving them as a force working to rearrange the regions through the
development process by implementing policies and planning directives after linking the effectiveness of those forces to the reality of the potentials and their dimensions and through them the region counted through it a distinct region in its natural, human and economic characteristics.

4- The necessity of reviewing the philosophy of the structural plans of the governorates when dealing with the elements of the place where its spatial pages are intended to be used for utilitarian use in order to use priority priorities for activities, and the activities that will be drawn by economic and social forces in accordance with a planning vision and its sound design taking into account the controls, characteristics and motives of regional planning that is estimated In turn, the effectiveness and efficiency of the forces of spatial change (economic and social) in rearranging the spatial position of the region.

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