A vision of sustainable & smart knowledge based urban development in Iraqi cities: adopting GIS to determine knowledge capital elements and strategies in the city of Hila

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A vision of sustainable & smart knowledge based urban development in Iraqi cities: adopting GIS to determine knowledge capital elements and strategies in the city of Hila

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Abstract. The research seeks to explain the dimensions of development in cities according to the foundations and mechanisms of knowledge capital, especially urban capital, which contributes to enhancing the characteristics that create successful knowledge cities and support their strategies. A local case study was conducted to determine the potential of applying knowledge-based urban development strategies, and in accordance with the specific analytical framework for the characteristics and indicators of knowledge cities. The analytical framework for knowledge cities indicators will be adopted as a baseline for the analysis of the characteristics of the cluster and diversity. Two basic studies included: the structural plan for Babil province (five phases prepared between 2009 and 2010), and the master plan for Hila 2006. A survey method applied to collect the required, and use the latest available statistics about the city. The master plan of the city was analyzed, updated for specific indicators through GIS method. Opportunities for development of two axes were developed in the center of the northern and southern university. Implementation of the cluster strategy. In the center of the ancient city of Babylon, with knowledge gathering support strategy, and knowledge capital indicators are monitored according to the framework tested to determine the course of the three strategies.

Key words: urban development, knowledge cities planning, GIS.

1. Introduction

Cognitive transformation in cities is generally defined and then the identification of basic levels of transformation occurs through which the characteristics of each wave of transformation in the human

civilization are determined and the latest wave is based on high-value-added knowledge activities. The international perspective is the main framework of KC strategies, showed in 'Figure 1'.

Figure 1. Integrated Perspective of KC Development Strategies, (by researcher)

2. Knowledge clustering Strategy and Knowledge Networking Strategy indicators

"The concept of Knowledge City(KC) is not confined to the physical planning of the sites of knowledge groups" [1] The concept is about strengthening communication and enhance full control (by legislation) for the design and management of private and public projects and investments" [2]. "Networks mean enhancing functional relationships affecting products and services. The value of the connection may be greater than the actual value of the product" [3]. These goals are summarized into two strategies that are showed in 'Figure 2', and leaded to knowledge agglomeration as an urban characteristic of KC.
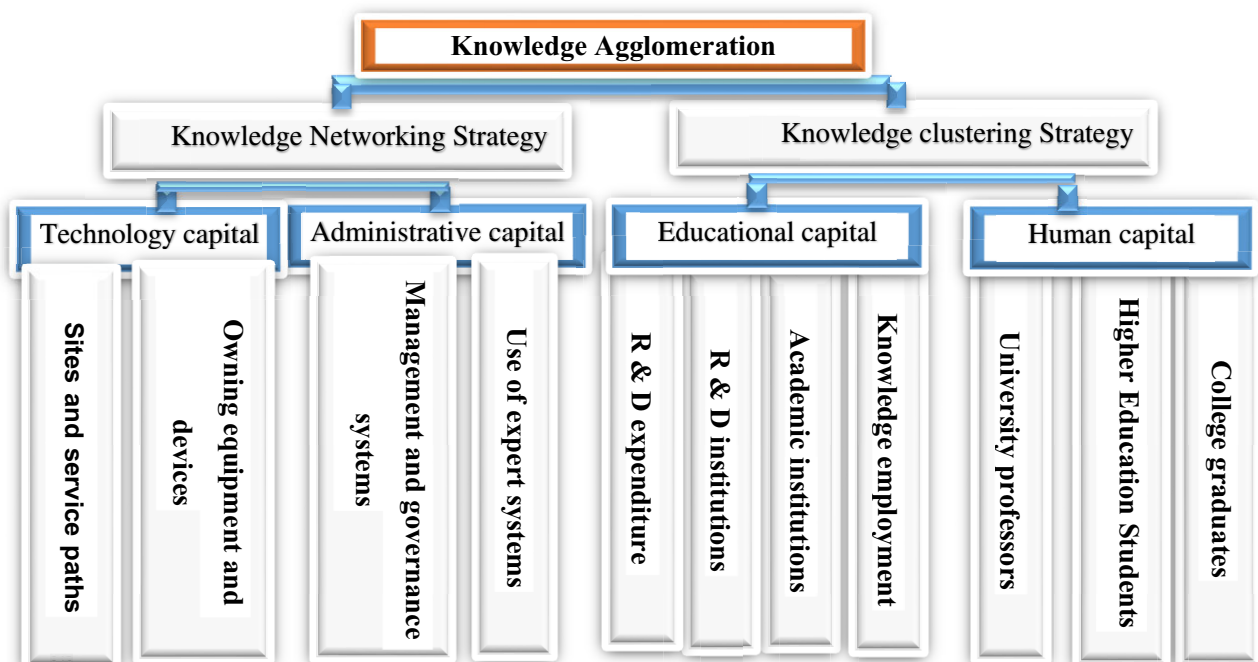

Figure 2. Vocabulary of the interpretation of the knowledge agglomeration characteristic, (by researcher).

3. Urban Capital Support Strategy indicators:

"Knowledge-City strategies refer to the process of interlinking these elements according to the term" City branding" [4], for example, marketing the city with a new attractive identity "based on several elements such as; policy, city management and external relations, tourism and private sector institutions and agreements, investments, events and culture, heritage and urban landmarks, and the community" [5]. With the aim of finding new dimensions of existing assets of value, or reading a new value of existing assets in the city, urban capital support strategy leads to urban diversity as an important character of KC that showed in 'Figure 3'.
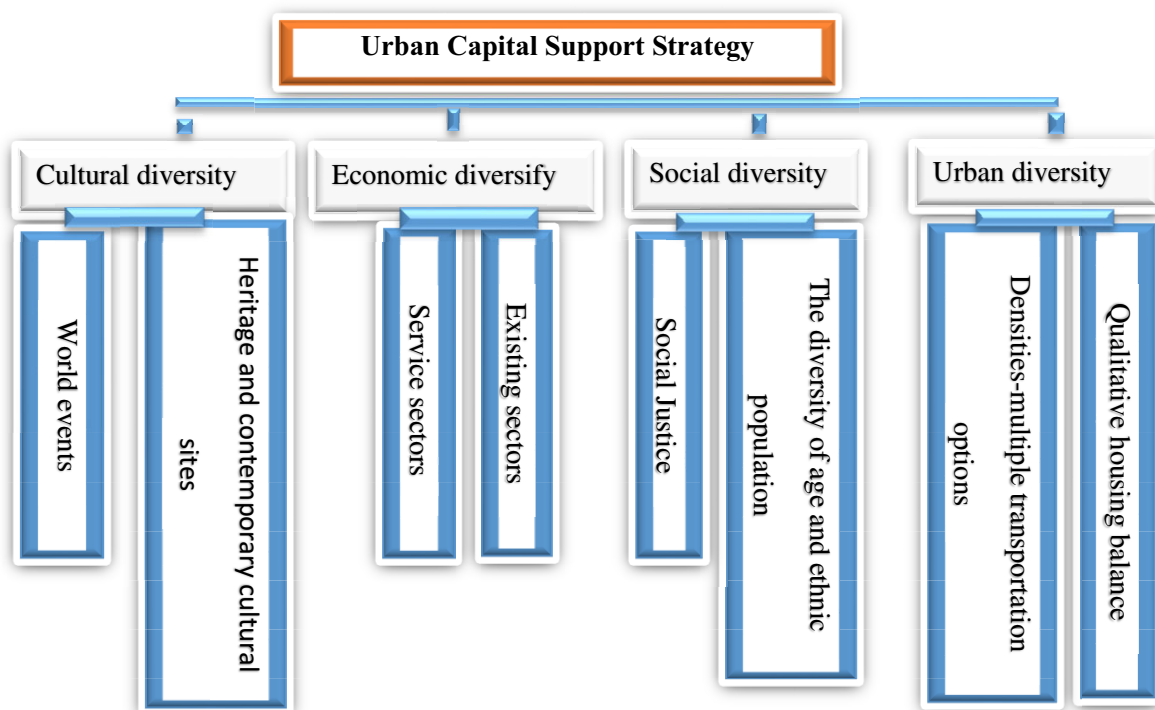

Figure 3. Vocabulary of the Interpretation of Cognitive Diversification, (by researcher)

4. Adopting GIS method to investigate KC characteristics in the study area:

The method depends on many global studies on KC strategies in cities like; Melbourne, Shanghai [6], Munich [7], and Amsterdam [8] & [9]. The application depends on using GIS method in order to prepare a vision of Figure 2 & Figure 3. Each one of these indicators investigated and represented in separated maps. Interventions to support the three strategies in the study area are developed according to the nature and opportunities of application. The composition of the activities, population and employment were organized according to the knowledge capital indicators, in order to produce results on the possibilities and

opportunities of realizing the concept by collecting information from the relevant state departments and the private survey see; (Strategies development studies for Hila, 2009-2010) [10], & (Hila master plan development 2007) [11-13].

5. Discussion and analysis of application results:

Analysis of the potential of the city of Hila according to the framework of the three strategies:

5.1 Knowledge clustering;

There are two main sites identified as core of nucleus to encourage knowledge groups in the city of Hila:

First- Universities site (Babil University Center, Future College, and The Islamic University) and the existing and specialized industrial zones in the south of Hila city.

Second- Universities site (University of Babylon at the site of Morjan) and the existing and allocated industrial areas located north of the city of Hila, towards the province of Baghdad.

The importance of identifying these two sites for the implementation of the knowledge gathering strategy is focused on achieving the following:

a- Strengthening educational and human capital: These sites represent the main entrance to the city of Hila. They linked with the movement's axes (Street 40 and Street 60), which include several governmental and private colleges such as the Faculty of Medicine, Pharmacy, Dentistry and Science collages of the University of Babylon and the University of Hila and the Colleges of Future private University.

b- The city administration can take the initiative, as in the Shanghai experience [6] to support the change of land use in these two sites (which have been designated within the design as industrial zones) for technology-intensive activities and services in support of knowledge activity.

5.2 Knowledge Networks;

The network building strategy is the vision of the city from the perspective of maximizing access to intensifying the active exchange of information, collective learning and innovation, intelligent deployment of residential and commercial uses. Networks rely on interconnections to pass and improve horizontal links that extend across the boundaries of individual institutional organizations or vertical links within the organizational structure of the institution arises because of the response to the administrative and technological capital mechanisms by linking the (knowledge-intensive) clusters to the supply and exchange networks of knowledge and services. The most important obstacles to the construction of such networks in the city of Hila lack of administrative vision and imbalance in the relations between the parties to the economic process (planning, service and legal). The other is the response to the technological capital mechanisms of spreading technologies within the city's society and employing techniques to improve the productive performance of the working groups. A high percentage of technological capital indicators have

emerged for the availability of equipment and service networks, with a lack of employment in the field of promoting innovative work (the use of technologies in higher education institutions is limited to scientific research and education).

5.3 support urban capital diversity;

The indicators of strategy of the urban capital diversity supporting in Hila city found in two locations:

- The location of the northern gate of the city, linking the city of Hila to the capital Baghdad and the location of the old city center. The indicators of diversity in this site are the following dimensions:

Urban dimension: includes broad and diverse requirements for urbanization patterns, urban form, scale, coverage, variables related to quality of life, open space patterns, etc. These variables have been neutralized (in the present research as it focuses on defining a general framework for the study of urban transformation and the concept of cities of knowledge) following:

- Multiple housing options: Includes the availability of land suitable for the expansion of housing and the diversity of housing patterns in terms of size and nature of occupancy of housing units and housing vertical and horizontal.

The proposed master plan of the city proposed to empty the old area of the city from residential use and allocate it for commercial use, while providing new residential expansions within the boundaries of the old center and the south-east side of the city (the new design area 470).

The urban housing strategy is based not only on the type of housing, but also on the importance of providing a variety of housing styles to meet the needs of the groups that attract the knowledge-intensive communities (universities and productive institutions) Technology and research and development activities), which are the youngest groups of researchers, students and smaller families. The types of housing available near the proposed knowledge clusters include the following:

- Separate or semi-detached housing type: This is the most common practice in Hila currently consisting of separate or semi-detached residential buildings consisting of one or two floors

- Multi-story housing: located in several clusters of apartment buildings consisting of 3 to 5 floors. This pattern will continue to form the main component of the housing block in the future. Also, a new set of patterns can be included, and coordinate with the locations of clusters identified as part of the strategy of knowledge groupings. This can illustrated especially in the presence of large tracts of unused land near the proposed sites, for the implementation of the cluster strategy and the existence of multi-story residential complexes on the road Hila - Najaf and near the southern location of the University of Babylon).

- Other styles: Some of the multi-story buildings and uses began to appear along the arterial streets in the city, which represents a balance of residential styles more diverse and appropriate to the requirements of student groups and small families.

- The locations of the proposed knowledge groups represent a variety of opportunities to support the housing balance, but unevenly. The proposed southern location offers larger areas of expansion. This feature is not available for the purpose of residential expansion in the northern location of the proposed bloc due to the density of housing in this area. However, this area is characterized by the existence of the river and large areas near the university site itself. These characters give a strong chance to reuse cultural sites that accommodate the events of the university and the city.

- Multiple options of transportation:

The path of the river connects the archaeological site in Babylon with the old Hila Center (the site of many heritage sites and shopping centers). This provides the possibility of connecting both heritage and archaeological centers with river paths and organizing land uses to strengthen this axis (heritage sites - open spaces and archaeological city). The lack of efficiency and inadequacy of existing roads is noted to accommodate the increasing density of vehicular traffic, while there is potential for developing river transport between these two sites, thus expanding mobility options for the population. The presence of the bridge project (the incomplete bridge of the mother) can be the focal point between the area, the city center and the southern university site (the proposed nucleus in the knowledge gathering strategy). This enhances the densities and expands transportation options.) To build bridges to connect the two banks of the river in that area.

-The social dimension: The city of Hila generally has strong foundations for social diversity. The role of the proposed two elements in the strategy of supporting urban capital in promoting social diversity is accompanied by its role in achieving cultural diversity. It is attractive to visitors and strengthens the axis between the archaeological site and heritage center of Hila. Proposed to revive the role of the city's urban center in social and economic life.

- The economic dimension: The axes between the city and the proposed nucleus are characterized by the following:

- The development of traditional sectors, which include the industrial zones (the industrial neighborhood in the southeast of the city and the industrial facilities located on the main axes and their branches between the north and south of the city, and these areas include most of the areas defined by the basic design for the expansion of industrial activity.

The proximity of these proposed sites to the knowledge groups (universities) is preparing to form an integrated nucleus in the future to be a gathering of knowledge-intensive activities.

- The possibility of developing services that supporting the activity along Street 60. This street is characterized by administrative and government use, hotel services and restaurants while the Street 40 is witnessing large changes driven mostly by the private sector where increased areas for commercial use (retail and hotel services are available), which focuses most of the private companies in the city, (Travel and tourism services, Internet companies, contracting, public investments, etc.)

-*The Cultural dimension*: The importance of the proposed knowledge-gathering site in the north of the city is to enhance the cultural dimension due to its proximity to the archaeological site of the ancient city of Babylon and near the Shatt al-Hila. This site extends to the center of the new city through the hub of the road Hila - Baghdad and the intersection of Street 40 to link between the old sites in the Babylonian archaeological area and religious sites as the site of the response of the sun). The tourism sector is a great opportunity to attract tourists and employment of labor because of the presence of elements of this sector in the city.

The river-link hub also provides the opportunity to extend the activities of the annual Babel Festival to the old city center and to create new events and expand them to include activities related to the heritage character of the city center.

6. Conclusions

Urban capital represents an important catalyst in organizing the strategic vision of transforming a city into a knowledge-based urban landscape.

- Urban capital enhances the indicators of other components of knowledge capital according to their priorities. Accordingly, knowledge groups are formed. Knowledge networks are established and the pattern of their spread and expansion is determined.

The city of Hila has been evaluated according to the theoretical framework indicators; possess particular hierarchical arrangements for the three knowledge cities' mechanisms and strategies (group support, support for building networks and support for urban capital diversity)

- The urban form and the pattern of expansion of the case study as a special and distinct case and this confirms the key role of urban capital indicators in activating the spread of clusters based on knowledge activities and activating the construction of knowledge networks locally and regionally. The result of these conclusions arranged as visions maps for Hila by using GIS method, and the maps showed in Figures 4, 5 and 6.
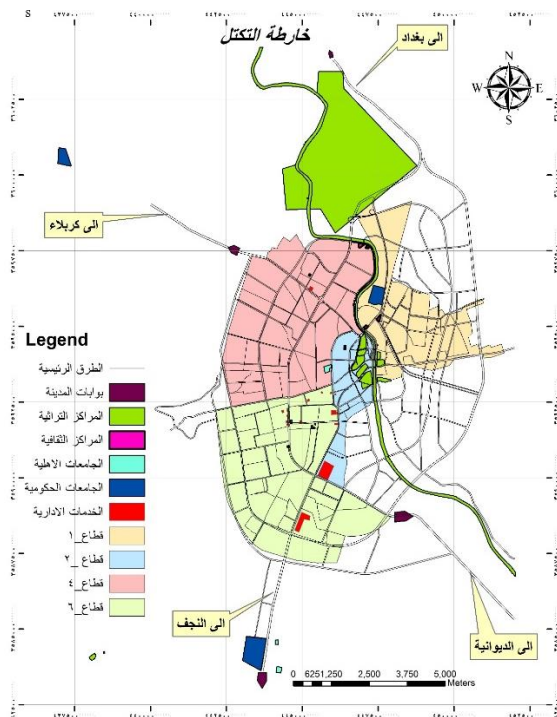
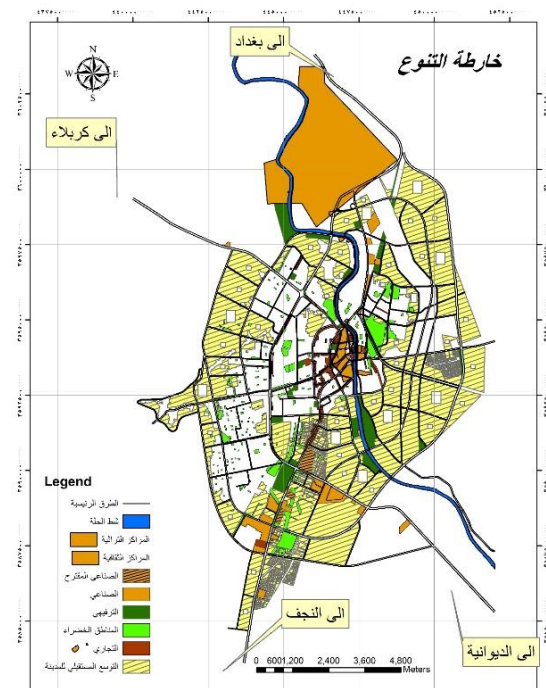**Figure 4.** Knowledge agglomeration indicators in Hila (by researcher).

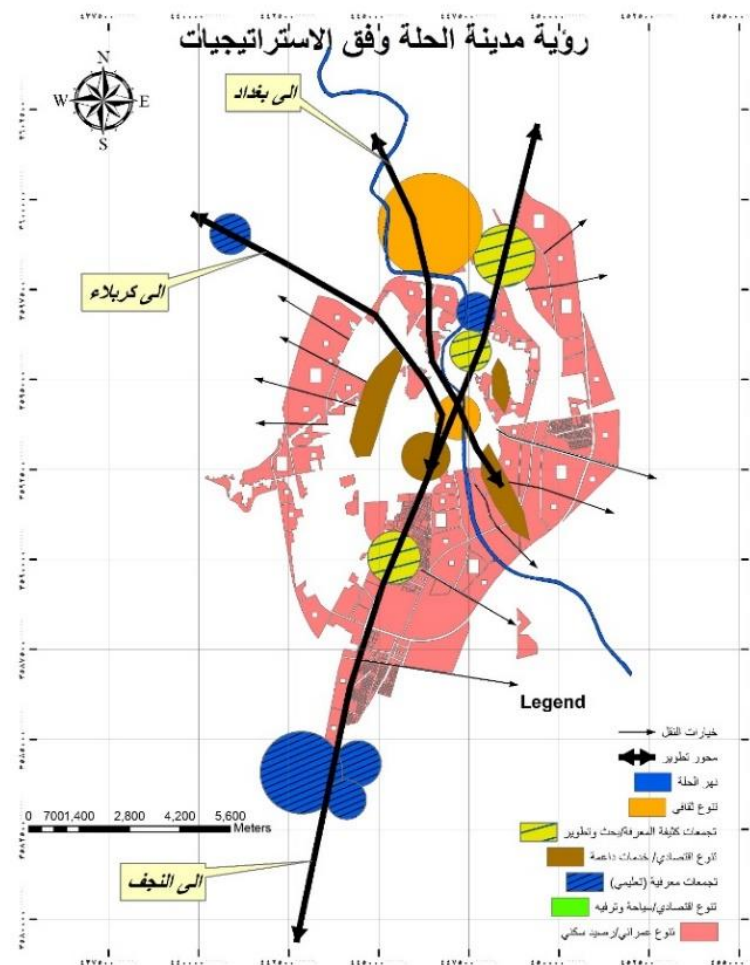**Figure 5.** Urban capital diversity indicators in Hila (by researcher).

Figure 6. Future vision of the urban structure of Hila city according to strategies to
support the urban capital and knowledge networks and networks (by researcher).

7. Recommendations

Adoption of new trends (imposed by the mechanisms of knowledge capital) as basic principles of
urbanization. In this regard, the application of knowledge city strategies provides an integrated perspective
of the city as a group of potential opportunities for interaction and not as isolated elements. Also, using GIS
as an adopting method for explaining cities future visions for smart development which direct the resources
towards the most promising urban spots.

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