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PLANNING INDICATORS OF THE RELATIONSHIP BETWEEN MIXED LAND USE AND URBAN STRUCTURE

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Abstract
The principle of mixing and diversity in land uses is one of the most important indicators addressed by most contemporary planning studies, trends and approaches in order to achieve urban sustainability, as well as It is considered an effective tool. To compare cities and urban areas in terms of balanced and diverse distribution of land uses, as it also supports sustainable transportation patterns (walking and cycling) and provides easy access to events and activities due to the proximity feature. Which supports the quality and type of integrated urban infrastructure features, as there is a close relationship between increased walking and health and well-being indicators. [1]
It is expected that if the phenomenon of rapid changes continues at the level of the strip streets towards commercial and mixed use within the residential alleys, which gives them the advantage of functional diversity, mixing land uses and increasing density locally, this is one of the principles of urban sustainability, but it is an unplanned and random act, which may have negative effects on the population more than its positives. At the same time, the intensive increase in commercial activity on the main streets and the diversity of activities in a mixed manner between wholesale and retail trade, restaurants, fitness centers, banks and shopping centers has led to an increase in the economic value and prices of land and made it a desirable area for housing and work as well, due to the availability of social and marketing services and ease of access to it. [2]

Keywords
Land Uses, Urban Sustainability, Sustainable transportation, Baghdad

Introduction

Land Use Planning - Concept and Objectives

The urban land use planning process is part of a comprehensive planning process that develops future visions for urban, administrative, social, cultural, economic, service and environmental development and future land use patterns. The basic principles of land use planning are:

1- **Principle of optimal use** Every piece of land must perform a specific function in the national economy in a way that serves the public interest and achieves the maximum possible benefit, while emphasizing modern and sustainable planning. This concept is relative, as what is optimal in one area may not be so in another..
2- **The principle of multiple Land Use :** To be multiple Uses Single plot especially where good land and services are scarce and usually controlled by Uses Land is a set of factors, the most important of which are: the topography of the site, where activities tend to be in flat areas and close to transportation routes, the composition of the soil and its ability to withstand the

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buildings erected on it, competition between different uses in the same spatial area, transportation routes, which usually impose certain patterns of uses and direct the extension and movement. Uses Urban land, the land value factor which varies according to supply and demand, proximity or distance from the center, topography, function, population density, etc., the effect of change in the prevailing and neighboring investment pattern For use Technological progress that affects the lives of the population and the distribution of public facilities, invasion where the use of invasion Uses Other, gathering or separating where Patterns gather Uses Similar ones are separated and different ones are separated.3]

Planning indicators for mixed use of land and urban structureAmong the most important planning indicators that have an impact on the mixed use of land and urban structure are:

- **Accessibility Index**: Reducing long travel distances to meet needs (proximity of individuals to activities, services and job opportunities)
- **Utilized area index**: The space that includes the activities of the designated use and is formed according to the function of the occupying use and the population density.
- **Vitality Index**: Life is represented by the existence of people and is an important element of the quality of the physical environment. Its most important principle is that the environment should be compatible with the basic structure of man.
- **Street traffic indicator**: The movement of people and vehicles within an organized transportation system at variable rates according to specific times.
- **Privacy Index**: Public use areas and spaces include residential neighborhoods, main roads, commercial areas, open spaces and green spaces.
- **Diversity and Integration Index**: The possibility of practicing many activities within the residential neighborhood (housing, work, entertainment, social activities) The existence of relationships that link the different elements within the environment, which leads to harmony between them and achieves sufficiency.

Research methodology

1- Introduction / Baghdad CityCity of Baghdad currently has many problems in terms of urban and constructional structure, as it has gone through many political, economic and social changes, and this has been reflected in the achievement of human needs, as this is clearly evident in the outskirts and suburbs of the capital in particular. The focus was on the center in providing basic services and commercial centers, and this is one of the most important reasons affecting the city's properties, in addition to the fact that…no Inappropriate use of the land and for other purposes Delicious It was created for this purpose, and most residential areas have been planned and built recently in a way that does not suit the residential need, whether from a design or social perspective, without taking into consideration the nature and orientation of the society for which they were designed. And the extent of its impact on the urban landscape and infrastructure

It is well known that Baghdad is the capital of Iraq and the first city in it, which distinguishes it from other cities because it represents a special center for the economic aspect in the country, as it contains more than 50% of the public services in Iraq, which made it a center for most of the technical and scientific skills and a place to attract educated people, which led to a rise in the standard of living in it

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and the provision of greater job opportunities compared to the cities of other governorates. All of this was a major reason for a major boom in migration to cities in general and to Baghdad in particular, which generates great pressure on all services, transportation and urban infrastructure.

Occupies **neighborhood April 9**A location closer to being central than the capital, Baghdad, and closer to the eastern side of it, between the lines of longitude(E0'26°44) And (E0'28°44) and my latitude (33°13'0" N) and (33°11'0" N) To the southeast of Al Ghadeer Municipality.[4]

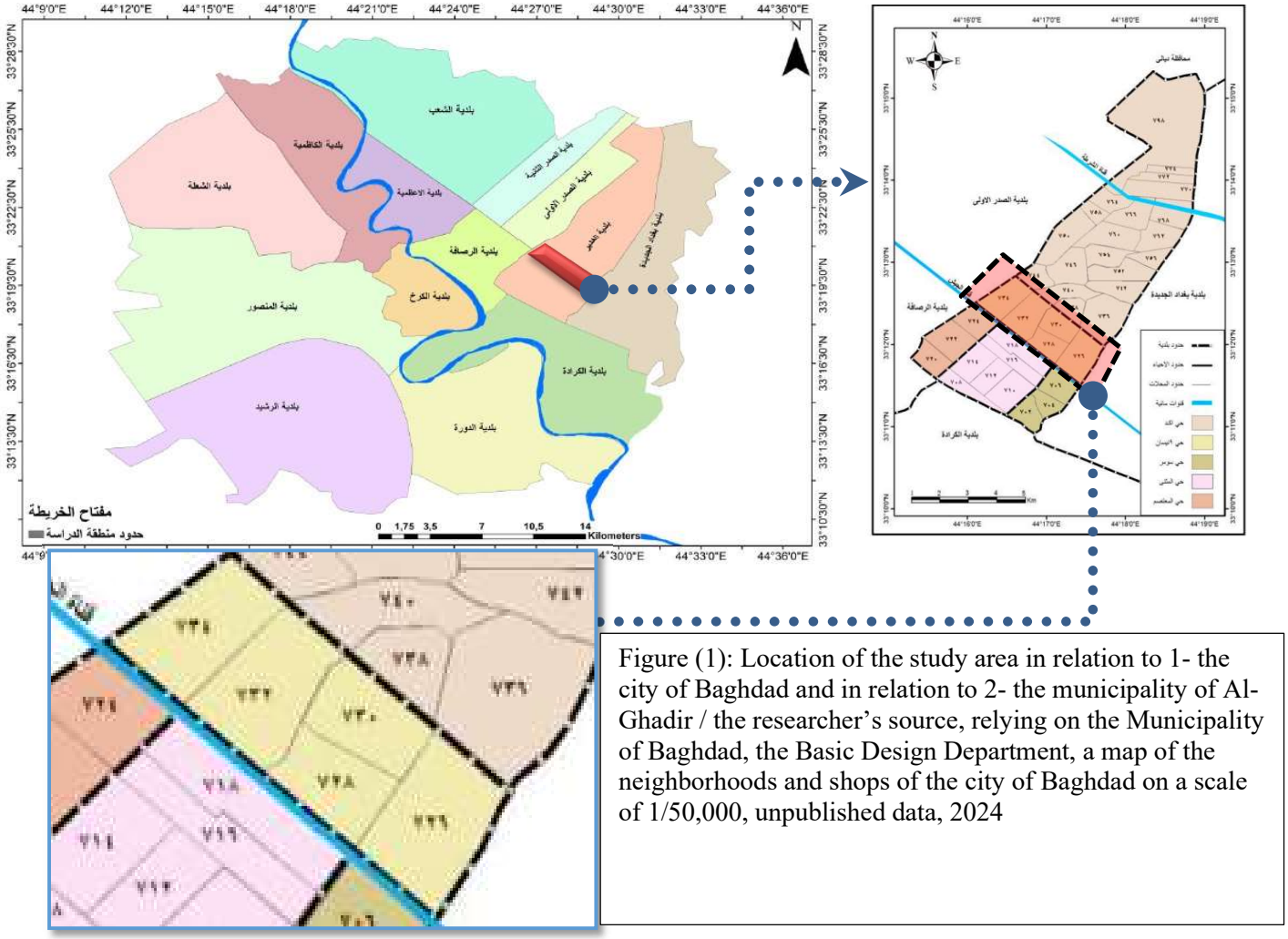

Figure (1): Location of the study area in relation to 1- the city of Baghdad and in relation to 2- the municipality of Al-Ghadir / the researcher's source, relying on the Municipality of Baghdad, the Basic Design Department, a map of the neighborhoods and shops of the city of Baghdad on a scale of 1/50,000, unpublished data, 2024

Study area / 9th of April neighborhood

The 9th of April neighborhood is distinguished by the presence of integrated services represented by the presence of many vital facilities such as schools (primary, secondary and kindergarten) and a health center in addition to government departments and institutions, most notably the New Baghdad Court, the Palestinian Buildings Complex, and residential complexes under construction (Al-Furqan Complex and Al-Zahour Complex). It is also distinguished by the presence of...Mixing land uses Specifically in District 726, which combines administrative, recreational, residential and service uses, and is separated from the New Baghdad Municipality by a street. In Baquba or What is calledAl-Amin Street.

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The neighborhood consists of five residential units (726,728,730,732,734) and With an area of (773) hectares and constitute a percentage15% of the total area of the municipalityadult5187) (hectares. [5]

Land uses of the study area

Land use is considered an important topic because it is one of the forms of spatial difference within the city, as it performs different activities for its residents and residents of the surrounding areas.

The spatial distributions of the functions available in the city, which are represented by commercial, industrial, residential, transportation, green and recreational areas, and services (educational, administrative, and religious) within the city limits, are a clear definition of the uses of the land in it, as it is the place where people practice all activities and investments in order to achieve the well-being of the city. It is the focus of attention of many planners, geographers, and urban designers. The reason for this interest is not because it is an aspect of the city, but rather because it represents a form of spatial variation in the activities that are practiced. Therefore, the process of dividing the city into different uses is not considered a door to separation or fragmentation, but rather to show the extent of the development of the functional relationships of each use and its relationship to the functions of the rest of the different uses within the city limits. [6]

Figure (2) : Land uses for the study area (9th of April neighborhood) current status for the year 2024 / Source: prepared by the researcher based on the program (Arc Gis)Satellite image and field survey in data entry

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%	Area (hectare)	Usage
32.14	248.44	**Residential**
1.94	14.9	**Residential buildings**
2.80	21.64	**Commercial**
25.06	193.72	**Mixed**
1.76	13.62	**administrative**
1.93	14.93	**Public Services**
0.48	3.73	**religious**
2.06	15.92	**Educational**
0.12	0.82	**healthy**
1.35	10.43	**Empty land**
11.07	85.46	**Green and entertaining**
0.45	3.5	**Parking**
18.84	145.67	**transfer**
100%	773	**Study area boundaries**

table(1) : Areas and percentages of land uses in the study area, current situation for the year 2024/ Source (researcher based on the field study of the current situation of the study area and the program of GIS in area calculation

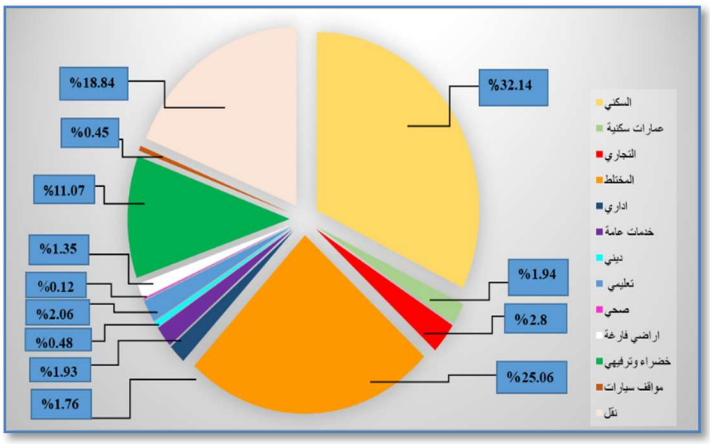

Figure (3): A graph showing the land use ratios for the study area/source (prepared by the researcher based on the field study and Table No. (1)

Mixed use in the study area 2024

The reality of the distribution of mixed land use in the study area for the year 2024 is represented by a group of uses and different areas. The area of mixed land use reached (193.72) hectares, representing a percentage of (25.06%), as mixed use within the study area included the following:

- Residential use (3 vertical residential complexes + residential units of different sizes)
- Administrative use (court, military headquarters, warehouses, Al-Ghadeer Municipality Department, Border Guard Forces, Post Office, Numbering Department)
- Commercial use (shops, Iraqi duty free market, spare parts trading center)
- Use of open and green areas (sports fields, empty lots, conservation area, parks)
- Use of public services (government hospital, private hospital, health center, private schools, gas station).

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- Industrial use (food industry, car repair and maintenance).
- Use of transportation (public garage).

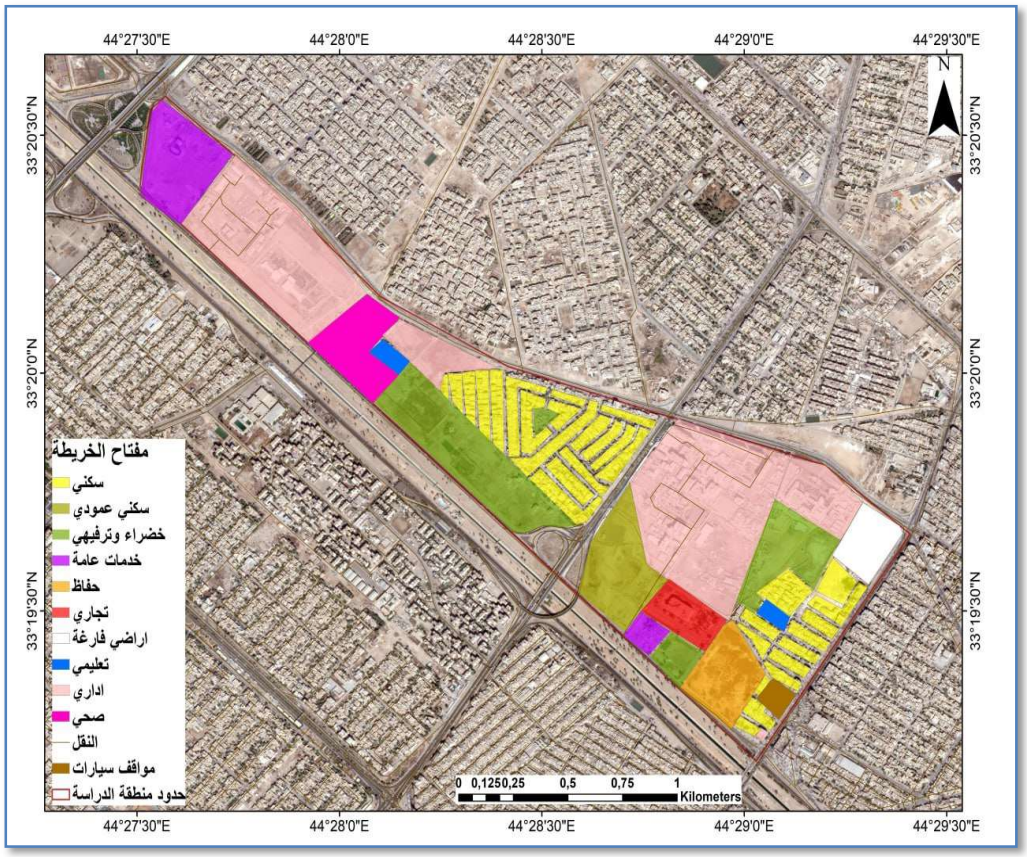

Figure (4) : It clarifies the reality of the mixed land use situation in the study area for the year 2024/ Source: Prepared by the researcher based on the field study and the Geographic Information Systems program GIS

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Table (2): Areas of land uses included in mixed use in the study area for the year 2024 / Source (researcher based on the field study and Map No. (10) and calculating areas using geographic information systems ARCMAP 10.8.2		
Area (hectare)	Services included in mixed land use	**Usage AT located within mixed land use**
27.58	Different size residential units	**Residential**
9.76	3 vertical residential complexes	**Residential buildings**
4.48	Central markets, used car trade, car spare parts trading company, Iraqi free market zone	**Commercial**
63.45	Court, military headquarters, warehouses, Al Ghadeer Municipality Department, Border Guard Forces, Post Office, Numbering Department	**administrative**
11.34	2 fuel stations	**Public Services**
1.78	**Private and public schools**	**Educational**
7.56	Government hospital, private hospital, health center	**healthy**
4.54	-	**Lands Empty**
27	Sports fields, empty lots, parks	**Green and entertaining**
1.25	**Public transport garage**	**Parking**
7.33	Hafiz area	**Preservation**
27.65	**Main and secondary streets and bridges**	**transfer**
193.72		**the total**

Analysis of the current status of land use in the region

By studying the current reality of the study area and analyzing the geographical distribution of land uses, it became clear that there are many differences between the area of sites designated for uses according to the basic design and the area of current sites for these uses. This is evidence that this clear change in uses during the period of time between the development of the basic plan for the year 1973 and the field study of the current reality of the area for the year 2024, when comparing them, it is proven that there are many factors that had a direct and indirect impact on these changes, including economic, political and social factors, the most important of which was internal migration as a result of the circumstances that the country was exposed to after 2003.

The area of many of the current land uses has changed from the basic design, with the largest share of the change being from residential to commercial use, which has caused a decrease in the area allocated for residential use and an increase in commercial use, despite the establishment of huge vertical

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residential complexes within the area. However, this does not prevent residential use from being the largest use within the area. Mixed use followed, as it occupied the largest variable area towards (increase), followed by transportation use. The use of recreational and open areas witnessed a noticeable change in their area and moved towards (decrease). This is due to the residential encroachments occurring in the area and their owners dividing them into plots of different sizes and selling them, which led to changing the type of their use from green and recreational lands to residential lands, which was one of the most important reasons for the gradual filling of these lands with residential units to meet the residents' need for residential units, in addition to the transformation of most of the squares into private schools and commercial buildings.

While administrative use witnessed a significant and clear increase in the study area after it was almost non-existent in the basic design, the increase in the area of administrative use is mainly due to planning factors related to changing the classification of some areas from other uses to administrative use in response to the decision of the Baghdad Municipality to change as a result of the urgent need for governmental and administrative services in the area. While the use of public services occupied the smallest variable area as a result of exceeding other uses, as shown in the table below:

Table (3): Spatial changes in land use in the study area for the period between (1973-2024) / Source (researcher based on: 1- Data from Table No. (1) and (2) 2- Field study

Duration (1973-2024)		2024		1973		Usage
Change %	**variable space (hectare)**	**%**	**Usage area (hectare)**	**%**	**Usage area (hectare)**	
10.58-	**81.66-**	**34.06**	**263.34**	**44.64**	**345**	**Residential**
1.5	**11.64**	**2.80**	**21.64**	**1.3**	**10**	**Commercial**
		-	**-**	**-**	**-**	**Industrial**
16.7	**63.17**	**19.30**	**149.17**	**11.13**	**86**	**Transport**
0.67-	**5.07-**	**1.93**	**14.93**	**2.6**	**20**	**public services**
19.69-	**152.22-**	**11.07**	**85.46**	**30.76**	**237.68**	**Recreational use and open areas**
1.8	**13.62**	**1.8**	**13.62**	**-**	**-**	**Administrative**
15.46	**119.72**	**25.06**	**193.72**	**9.6**	**74**	**Mixed use**
0.5	**3.73**	**0.5**	**3.73**	**-**	**-**	**religious**
0.10	**0.82**	**0.10**	**0.82**	**-**	**-**	**healthy**
2.06	**15.92**	**2.06**	**15.92**	**-**	**-**	**Educational**
1.35	**10.43**	**1.35**	**10.43**	**-**	**-**	**Empty spaces**
0	**0**	**100%**	**773**	**100%**	**773**	**the total**

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Results of the practical study

- **Measurement method**

t has been adopted the study On scale Likert Pentagram in sample answers to the questionnaire, The level of each variable will be between (1-5).And the table number(4) It shows that:

Table (4): Weighted average and response scale/source (researcher based on source: (Ezz Abdel Fattah: 541:2008)

4.21 - 5	3.41 - 4.20	2.61 - 3.40	1.81 - 2.60	1 - 1.80	AverageLikely
I agreeVery much	Aagreed	neutral	Noagreed	NoagreedVery much	Answer scale
very good	good	good	weak	Very weak	Answer level
high (High)		middle (Moderate)	low (Low)		Evaluation

The following table summarizes the statistical results of the respondents for all the researched topics.:

Table (5): Descriptive statistics for the results of the researched topics / prepared by the researcher based on the outputs of the SPSS program

Evaluation	relative importance	Standard deviation	Average overall measurement	Repetition	Topics covered	T
H	73.12%	0.8956	3.656	160	Diversity and integration axis	1
H	76.2%	0.9444	3.81	160	Accessibility Hub	2
H	75.8%	0.8525	3.79	160	tality axis	3
H	75.32%	0.9738	3.766	160	Privacy Axis	4
H	69.88%	1.0256	3.494	160	reet movement axis	5
H	73.4%	0.992	3.67	160	s of the utilized area	6
H	73.95%	0.947	3.697	160	All axes (independent variable)	
H	78.04%	0.9158	3.902	160	Dependent variable	

Mcut low) l,)3.39- 2.60 : Matt and The middle Moderate) m ,)5- 3.40: High(H] -: Evaluation(Assessment))2.59-1

Table (5) indicates the averages, standard deviation, relative importance, and level of evaluation related to the point of view of the sample studied regarding the six main axes of the questionnaire, represented by (the axis of diversity and integration, ease of access, vitality, privacy, street movement, and the axis of exploited space), The results were distributed between the highest level of response achieved by the axis (ease of access), as the average value for it reached (3.81), and thus it approached the upper limit

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of the degree of agreement, which is (5) with a standard deviation of (0.9444). This means that the percentage of respondents confirm the existence and importance of ease of access. As for the axis (street movement), it achieved the lowest level of response, as its average value reached (3.494) with a standard deviation of (1.0256). This means that street movement is not characterized by organization and coordination.

It is clear from the table above that the evaluation rate for all axes recorded a high response rate, and the response rate for all axes recorded (3.697) It is higher than the cut-off threshold according to the adopted scale (hypothetical mean 3), and this shows the extent of consistency of the specialists' responses to each other regarding what was included in the questionnaire according to the adopted axes regarding the characteristics of the urban structure and mixed use of land.

Conclusion

Most of the land uses in the study area have undergone several changes, the most prominent of which were the changes in area. The area changes included various land uses.

If the research relied in its study of the spatial change in land uses on the analysis of the spatial distribution maps of the uses that occupy areas in the study area. After conducting an analysis of the proportions and areas of land uses in the area, it became clear that there is a clear change in the area and type of land uses in the distribution and number, which affects the structure, shape and design plan of the study area. This in turn leads to a change in the internal structure of the city in addition to the development of the residential function in the area. The changes that occurred in land uses and resulted primarily from population growth led to a change in the basic structure of the city and led to an imbalance that the basic plan aims for.

The most prominent reasons for the change in the type, area and distribution of land uses that were reached after conducting the field survey and analyzing the results were due to two main factors:

1- **population growth** Population growth resulting from natural population increase and internal migration are among the most important factors that have affected the internal structure of the city.

2- **The phenomenon of encroachment on land use**It is considered a global phenomenon and prominent in most developing countries and an urban problem that is difficult to isolate from the social and economic conditions of society in addition to demographic and planning reasons and other reasons that helped in the emergence of violations.

Recommendations

1- The processes of changing uses must be organized and controlled so that they are not random. There is a need to conduct continuous analytical processes to determine the change in the system of interconnected relationships between the elements of land uses, especially the transformation of residential use into commercial.

2- In the event that mixing of uses is allowed in residential areas, appropriate uses must be chosen, such as commercial shops for daily goods such as bakers, grocers, and butchers, and large commercial gatherings should be isolated from housing, and crafts or workshops that cause disturbance to residential areas should be prohibited (such as car repair shops, blacksmithing and carpentry workshops), as This solution can be reached through the gradual process.

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3- Establishing special streets or areas for sables designated for mixed uses. These areas have special specifications. They may be closed like ancient Arab markets, or they may be open commercial streets designated for sables only at certain hours of the day, or cars do not enter them at all. Parking is provided for customers' cars nearby. Al-Sabila areas. These areas are connected to public transportation lines, especially in crowded areas.
4- Media agencies must contribute to this process by educating citizens about the necessity of adhering to the laws and conditions issued by the Municipality of Baghdad and responding fully to them in the event of modification or removal of the aforementioned changes, by involving citizens in the process of planning land uses When preparing the basic designs and in the event of changing uses, to get to know their opinions and impressions about these issues, since they concern them in the first place, and because planning aims to achieve comfort, security, and luxury for citizens by creating a comfortable environment for living within the cities. Citizens can be involved after the process of education and introduction to planning terminology and maps through... Holding workshops and seminars in this regard so that participation is real.
5- The primary purpose of the emergence of commercial streets is to provide life services to citizens, ease of access to them, and reduce pressure on major city centers. Therefore, these streets must be characterized by spatial efficiency that makes them achieve the goals of citizens in providing services and achieving luxury and enjoyment by providing an appropriate environment in them.

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