URBAN EXPANSION AND ITS IMPACT ON THE EFFICIENCY OF SERVICES IN THE PROVINCE OF BAGHDAD - IRAQ

2023
MASTER THESIS
DEPARTMENT OF GEOGRAPHY

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Prepared as

Master Thesis

KARABUK

August 2023

TABLE OF CONTENTS

Page

Page

Page

Page

THESIS APPROVAL PAGE

I certify that in my opinion the thesis submitted by Liqaa Mahdi OBAID titled "URBAN EXPANSION AND ITS IMPACT ON THE EFFICIENCY OF SERVICES IN THE CITY OF BAGHDAD - IRAQ" is fully adequate in scope and in quality as a thesis for the degree of Master of Science.

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DECLARATION

I hereby declare that this thesis is the result of my own work and all information included has been obtained and expounded in accordance with the academic rules and ethical policy specified by the institute. Besides, I declare that all the statements, results, materials, not original to this thesis have been cited and referenced literally.

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Signature :

FOREWORD

I am profoundly thankful for the unwavering support and guidance of my advisor, Assoc. Prof. Dr. Ashfak Ahmad KHAN, whose profound interest in my research and invaluable assistance have been instrumental in shaping this thesis. Dr. Khan's dedication to academic excellence, depth of knowledge, and commitment to his students have left an enduring impact on my academic and personal growth. I extend my heartfelt appreciation to my family and friends for their constant encouragement and understanding during this demanding journey, and to the entire academic community at Karabuk University for fostering an enriching environment for research. This thesis stands as a testament to the collective efforts and support that have made it possible, and I hope it contributes meaningfully to our field.

ABSTRACT

The aim of this study is to analyse urban growth in the study area, determine the patterns of growth using modern technologies, and track the development of the city of Baghdad from 1990 to 2020. The study aims to achieve the general objective of examining urban expansion in the study area and identifying the current expansion axes. It utilizes modern technologies (GIS technologies) to study and monitor urban expansion in Baghdad, with the goal of identifying future expansion axes and monitoring and measuring urban expansion through data sensing. Additionally, the study conducts a comprehensive inventory and geographical survey of the primary service centers in the city, focusing on their number, distribution, and efficiency. Maps for the expansion axes based on future proposals are developed using modern technologies, with the purpose of enhancing service efficiency, ensuring adequate distribution, and promoting fairness in the study area.

Furthermore, the study aims to determine the directions of urban expansion axes in the capital city of Baghdad to address issues such as encroachment on fertile agricultural lands, economic problems, and environmental damage caused by this expansion. The objective is to guide the expansion directions based on scientific planning principles, promoting axial and radial expansion in suitable open areas while avoiding encroachment on orchards and productive palm trees, which symbolize the environmental and economic wealth of the province.

The main problem arises from the rapid urbanization rate and the challenge of controlling the city's expansion due to migration, population growth, and a significant increase in population in major urban centers of Baghdad Governorate, particularly in Dora, Karrada, Kadhimiya, and Zayona. This population increase is not solely attributed to the urban revolution or the general increase in the region and country's urban population. Instead, it is mainly driven by the improvement in the overall economic situation since 2003, leading to an enhanced standard of living for the population during that period and up to the present day.

The study utilized an analytical approach to uncover the state of services in the study area through field research and the distribution of questionnaires in residential neighborhoods. This approach aimed to gather the necessary data and information for the study, enabling the development of planned policies to enhance service efficiency in line with future urban expansion. Additionally, the study employed a descriptive approach by analyzing available data, local studies, and relevant sources from both Arab and foreign origins.

The structure of the study was designed to align with the identified problems, hypotheses, and objectives. The thesis consisted of four research chapters, preceded by a summary, table of contents, tables, maps, figures, and visuals. The introduction to the research followed, providing an overview of the study, its problem statement, scientific hypotheses, objectives, methodology, justifications, sample selection methods, review of previous studies, and clarification of concepts and terminology. The chapter also addressed the study area's boundaries, location, and developmental factors.

The second chapter focused on the theoretical framework related to the urban system, urbanization, and urban expansion. It briefly discussed modern technologies utilized in the study, such as remote sensing, the global signature system, and geographic information systems. The second part of this chapter delved into the nature of social, health, educational, and transportation services, providing detailed information about each aspect. The third chapter encompassed a spatial analysis of urban expansion in the study area, along with prospects, and examined its impact on basic services using geographic information systems technology. Regarding the fourth and final chapter, it serves as a summary and discussion, emphasizing the conclusions and recommendations derived from the study's theoretical and practical components.

Keywords: Urban Expansion; Community Services; Urbanization; Baghdad

ÖZ (ABSTRACT IN TURKISH)

Bu çalışmanın amacı, çalışma alanındaki kentsel büyümeyi analiz etmek, modern teknolojileri kullanarak büyüme kalıplarını belirlemek ve Bağdat şehrinin 1990'dan 2020'ye kadar gelişimini takip etmektir. Çalışmanın genel amacı, çalışma alanında kentsel genişlemeyi incelemek ve modern teknolojileri (CBS) kullanarak Bağdat'ta kentsel genişleme eksenlerini belirlemektir. Veri algılama yoluyla çalışma alanında kentsel genişleme takip edilerek gelecekteki genişleme eksenleri belirlenmeye ve izlenmeye çalışılır. Ayrıca, şehirdeki ana hizmet merkezlerinin sayısı, dağılımı ve verimliliği üzerine kapsamlı bir envanter ve coğrafi araştırma yapılır. Modern teknolojiler kullanılarak gelecekteki öneriler temelinde genişleme eksenleri için haritalar geliştirilir. Bu haritaların amacı hizmet verimliliğini artırmak, yeterli dağılımı sağlamak ve çalışma alanında adil bir şekilde yayılmasını sağlamaktır.

Ayrıca, çalışma Bağdat şehirde kentsel genişleme eksenlerinin yönlerini belirlemeyi hedefler. Bu genişleme nedeniyle verimli tarım arazilerine, ekonomik sorunlara ve çevresel zararlara yönelik sorunları ele almayı amaçlar. Amaç, bilimsel planlama prensiplerine dayanarak genişleme yönlerini yönlendirmek, uygun açık alanlarda aksiyal ve radial genişlemeyi teşvik etmek ve çiftlikler ve verimli hurma ağaçlarına müdahale etmekten kaçınmaktır. Bu alanlar, ilin çevresel ve ekonomik zenginliğini simgeler.

Ana sorun, hızlı kentleşme oranı ve göç, nüfus artışı ve Bağdat Valiliği'nin önemli kentsel merkezlerindeki nüfusun önemli ölçüde artmasından kaynaklanmaktadır, özellikle Dora, Karrada, Kadhimiya ve Zayona bölgelerinde. Bu nüfus artışı, yalnızca kentsel devrim ya da bölge ve ülkenin genelindeki kentsel nüfus artışına atfedilemez. Bunun yerine, 2003'ten bu yana genel ekonomik durumun iyileşmesi nedeniyle bu dönemden günümüze kadar nüfusun yaşam standardının artmasıyla başlıca olarak tetiklenmiştir.

Çalışma, çalışma alanındaki hizmet durumunu saha araştırmaları ve konut mahallelerinde anket dağıtarak ortaya çıkarmak için analitik bir yaklaşım kullanmıştır. Bu yaklaşım, çalışma için gerekli veri ve bilgileri toplamayı amaçlayarak gelecekteki

kentsel genişlemeyle uyumlu şekilde hizmet verimliliğini artırmak için planlı politikaların geliştirilmesine olanak sağlar. Ayrıca, çalışma, mevcut verilerin, yerel çalışmaların ve Arap ve yabancı kaynaklardan ilgili kaynakların analiz edilmesiyle betimsel bir yaklaşım kullanmıştır.

Çalışmanın yapısı, belirlenen sorunlar, hipotezler ve amaçlarla uyumlu olarak tasarlanmıştır. Tez, özet, içindekiler tablosu, tablolar, haritalar, şekiller ve görsellerle başlamaktadır. Araştırmanın girişi, çalışmanın genel bir özetini sunarak, sorun açıklamasını, bilimsel hipotezlerini, amaçlarını, metodolojisini, gerekçelerini, örnek seçim yöntemlerini, önceki çalışmaların gözden geçirilmesini ve kavramların ve terminolojinin açıklanmasını içerir. Bu bölüm ayrıca çalışma alanının sınırlarını, konumunu ve gelişimsel faktörlerini ele almaktadır.

İkinci bölüm, kentsel sistem, kentleşme ve kentsel genişleme ile ilgili teorik çerçeveye odaklanır. Uzaktan algılama, küresel imza sistemi ve coğrafi bilgi sistemleri gibi çalışmada kullanılan modern teknolojiler hakkında kısa bir bilgi verir. Bu bölümün ikinci kısmı, sosyal, sağlık, eğitim ve ulaşım hizmetlerinin niteliğine daha ayrıntılı bir şekilde değinir. Üçüncü bölüm, çalışma alanındaki kentsel genişlemenin mekânsal analizini ve olasılıklarını ele alır ve coğrafi bilgi sistemleri teknolojisi kullanarak temel hizmetler üzerindeki etkisini inceler. Dördüncü ve son bölüm ise bir özet ve tartışma niteliği taşır, çalışmanın teorik ve pratik bileşenlerinden türetilen sonuçları ve önerileri vurgular.

Anahtar Kelimeler (Keywords in Turkish): Kentsel Genişleme; Toplum Hizmetleri; Kentleşme; Bağdat

ARCHIVE RECORD INFORMATION

Title of the Thesis	Urban Expansion And Its Impact On The Efficiency Of Services In The Province Of BAGHDAD - IRAQ
Author of the Thesis	Liqaa Mahdi OBAID
Thesis Advisor	Assoc. Prof. Dr. Ashfak Ahmad KHAN
Status of the Thesis	Masters' Thesis
Date of the Thesis	01/08/2023
Field of the Thesis	Department of Geography
Place of the Thesis	UNIKA / IGP
Total Page Number	238
Keywords	Urban Expansion; Community Services; Urbanization; Baghdad

ARŞİV KAYIT BİLGİLERİ (in Turkish)

Tezin Adı	Kentsel Genişleme ve BAĞDAT Şehrindeki Hizmetlerin Verimliliğine Etkisi - IRAK
Tezin Yazarı	Liqaa Mahdi OBAID
Tezin Danışmanı	Doç. Dr. Ashfak Ahmad KHAN
Tezin Derecesi	Yüksek Lisans
Tezin Tarihi	01/08/2023
Tezin Alanı	Coğrafia Anabilim Dalı
Tezin Yeri	KBU/LEE
Tezin Sayfa Sayısı	238
Anahtar Kelimeler	Kentsel Genişleme; Toplum Hizmetleri; Kentleşme; Bağdat

SYMBOLS AND ABBREVITIONS

SYMBOLS

ρ : Correlation Coefficient

σ : Standard Deviation

ABBREVITIONS

cov : Covariance

log : Logarithmic

var : Variance

ALCA : Average Linkage Cluster Analysis

SUBJECT OF THE RESEARCH

Major cities in the world hold significant importance in various geographical studies and research due to their influential impact on their surroundings. As dynamic variables, cities affect both their respective countries and the regions they inhabit. The study of cities serves as a gateway for exploring both the state and the geographical area. Cities serve as the central hubs of governance for their respective governorates, as well as the surrounding villages and communities. They foster mutual spatial interactions among these entities. Additionally, cities function as sites of production and consumption, and they are interwoven with political and administrative authorities. Urban growth is a widespread phenomenon encompassing economic and social dimensions, arising from human production and its interaction with the natural and human environment. [(1)] Urbanization is very important, especially since any urban centre that has turned into a "metropolitan" usually constitutes a source of information, a space for innovations, and a method for development. [(2)] The population plays a pivotal role in creating and organizing urban centers. In turn, urban centers exert influence over the organization of the population and cater to their needs **(3)**

The study of the factors affecting urban growth is an indispensable necessity in any country. Such studies provide decision makers and planners with valuable information and data, enabling them to achieve the necessary development in various aspects directly or indirectly related to urban growth. Consequently, it paves the way for economic and social progress and prosperity.

The population density and growth in urban areas of various sizes and characteristics, driven by specific functions, are influenced by a combination of natural and human factors. These factors can be identified by tracking the growth of urban communities and urbanization across different periods, each with its distinct characteristics. By assessing the degree of influence of each factor and determining future growth trends, appropriate plans can be developed in line with material, intellectual, social, and ideological capacities. This involves extrapolating from the past,

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[1] Al-Zawka, Muhammad Khamis, 1991 Regional Planning and its Geographical Dimensions, Dar Al. - Maarif p. 12

[2]Al-Fadhili, Bahjat, Muhammad Ali, 2000 Studies in Urban Geography - a book translated by Jacqueline Pouji Garnier, first edition, University Knowledge House, p. 38 .

3 Ibid., p. 55 .

studying the present, and analyzing it, followed by prediction and future planning considering different conditions—whether behavioral, structural, or demographic. The approach should be objective, scientific, and encompass all relevant applied elements. The study area has experienced significant expansion accompanied by a rise in urbanization rates, high population growth, economic activity, and social transformations driven by immigration. This expansion has resulted in increased demand for land use to accommodate the growing population. [4]

The utilization of comprehensive basic design schemes marked the beginning of economic recovery, leading to a further increase in population and land use demand. This expansion became particularly notable after the mid-1970s and early 1980s. Factors contributing to this include higher income rates, improved living standards, enhanced service levels, and the implementation of development and service projects that attracted a substantial workforce. All these factors have contributed to the urban expansion of the city.

PURPOSE AND IMPORTANCE OF THE RESEARCH

The aim of this study is to analyze urban growth in the study area, determine the patterns of growth using modern technologies, and track the development of the city of Baghdad from 1990 to 2020. Urban growth models are used to simulate and predict the expansion of cities and urban areas over time. These models are important tools for urban planners, policymakers, and researchers to understand the dynamics of urbanization, assess the impact of different scenarios, and make informed decisions about land use, infrastructure development, and resource allocation. Additionally, the study seeks to identify future growth trends and monitor and evaluate urban development. To improve the efficiency and equitable distribution of services in the study area, remote sensing data will be utilized, along with a comprehensive inventory and geographical survey of the city's basic service centers, including their quantity, distribution, and effectiveness. Furthermore, maps will be created to illustrate future expansion trends.

[4] Hijazi, Muhammad, 1982 Rural Geography, Dar Al-Maaref, p. 62

This study aims to investigate the patterns of urban expansion in Baghdad, the capital city of Iraq. Specifically, it focuses on the encroachment of this expansion on productive agricultural lands, addressing the economic challenges and environmental damage associated with it.

The objective is to elucidate the appropriate directions for trends in urban expansion, guided by scientific principles and effective planning. This involves expanding both axially and radially in suitable and vacant areas, while being cautious not to encroach upon the thriving palm trees and productive orchards that encompass and intermingle with these locations. These natural assets symbolize the economic and environmental prosperity of the province and preserving them is of utmost importance.

The study also tries to provide insights into the growth of urban outposts or suburbs that are economically, socially, and psychologically linked to the capital city of Baghdad. The study also seeks to identify the environmental and human variables that have an impact on Baghdad's urban growth and to explain these influences through their temporal and spatial interactions with each other. The research also seeks to create an accurate and thorough picture of the city's urban expansion, its trends fluctuations, recognize the advantages and disadvantages of the outcomes of this expansion, and work to create a clear vision to combat challenges in the future through the creation of effective urban development plans for future generations and adherence to the goals of sustainable development. Additionally, the study intends to assist the decision-makers to take the required steps to plan the expansion of the urban area in accordance with the ecosystems of the natural and human worlds. The current study will serve as a natural and human database utilized in planning and developing various areas within the city's urban space that had an impact on urban sprawl throughout the entire metropolis.

Therefore, the study tries to incorporate modern technologies in studying, identifying, and guiding the future expansion of the city. These technologies are crucial as they have proven to be effective methods for organizing and making decisions in the field of urban expansion. By utilizing such technologies, it becomes possible to plan and provide adequate and necessary services for the city's growth while maintaining control. This technology enables efficient handling of data and maps used in the service planning process, facilitating the selection of optimal service locations and axes for future expansion. Moreover, it facilitates achieving maximum development through human

interaction with the environment and meeting the increasing needs of the population. The rapid scientific and technological advancements have underscored the importance of adopting a scientific and systematic approach to direct urban expansion and effectively distribute and plan services within the city.

Due to high levels of urbanization and the expansion of the study area, which have a significant impact on services closely related to the population's livelihood and considering the role of modern technologies in urban planning, the study took several key considerations into account, the most important of which are:

1-Lack of scientific and academic studies on urban expansion and its impact on the efficiency of services in the study area.

2-The growing importance of the service sector in the urban structure of the city, and its connection to the life of the population.

3-Recognizing the extent of the population's satisfaction with the efficiency of services, as people's opinions have a significant impact on the process of identifying and signing service centers

4-Making a proposed model for the city's future expansion according to logical calculations based on scientific foundations.

METHOD OF THE RESEARCH

Methodology is a crucial aspect of research that guides the methods employed to achieve the desired research goals and attain accurate and appropriate results. Various statistical techniques were utilized to process the available data and derive precise and specific answers. It is noteworthy that the utilization of quantitative methods in geography gained prominence after World War II. This transformation resulted in geographical sciences transitioning from a purely cognitive subject to an applied science that addresses the diverse problems encountered by individuals in their surroundings. This shift led to a focus on contemporary topics aligned with the applied approach, providing accurate and detailed results and solutions to societal challenges. These challenges encompass the provision of services, housing, and the development of essential infrastructures. The research field moved away from traditional geographical themes and now encompasses subjects that align with practical applications, catering to

the needs of society and offering effective solutions. The study adopted an analytical approach to examine the state of services in the study area through a field study and the distribution of questionnaires to residential neighborhoods. This approach aimed to gather the necessary data and information required for the study. It also sought to formulate well-planned policies to enhance the efficiency of services within the city, considering future urban expansion. In addition, the study employed a descriptive approach by utilizing available data, local studies, and sources from both Arab and foreign contexts. This approach allowed for a comprehensive understanding of the subject matter and facilitated the analysis of relevant information to draw accurate conclusions.

The research encompassed a comprehensive range of information and data from various diverse sources, forming a solid foundation for the study. These sources can be likened to a data bank due to their significance in completing the research and aligning with the study's subject matter. The process of collecting data and information was laborious and subjective, involving both primary and secondary sources. The sources of data and information are as follows:

Primary sources of data collection

- Questionnaire Survey (300 respondents, 20 questions)
- Direct observation and monitoring of many cases related to the subject of the study, the most important of which is field study.
- Field visits to educational, health and service institutions on a frequent basis to get first-hand information and conducting personal interviews with officials and centenarians from population, health and education departments in the study area to track developments in services.
- Designing special forms for educational institutions and their educational stages for the purpose of completing a comprehensive inventory of these institutions.

Secondary sources of data collection

- Designing the maps of the study area, which are among the important sources.
- Information taken from library references, university theses and academic publications related to the subject of the study, as well as scientific research.

- Information and statistical data from government records of population, health, agriculture and education departments and bulletins issued by the relevant official departments.

Data representation method

In geographical research, various methods of data visualization are employed to effectively present information. The following methods were utilized in this study:

- Figures and Graphs: Important figures and graphs of primary and secondary data were developed to enhance the reader's understanding and comprehension of the subject matter.
- Tables: The study included a significant number of tables, which were the outcome of the field study. These tables contained valuable statistics and data relevant to the research topic.
- Distributional Maps: The study employed distributional maps to illustrate the geographical distribution of educational and health services and their variables in the province of Baghdad.

In addition, quantitative and statistical methods including descriptive techniques were utilized to ensure accurate representation of the data. These methods include measures such as relative change, percentages, location quotient, percentage increase, and location concentration ratio.

Analytical Programs Used in the Research

Several scientific definitions of the concept of geographic information systems have been mentioned in studies and research. Because of the multiplicity of its applications and objectives, the researcher explained some concepts from scientific sources, in which GIS is defined as a modern technology used by individuals and service institutions in collecting, processing, analyzing, transforming, and storing spatial information in the form of layers. It is built on databases that have the ability of analysis, updating and presentation in the form of tables and maps characterized by high quality and visual perception., **(5).**

[5] A.N. Esri, white paper, cartography capabilities trends NY.S1. CA. Jone, 2004, p.13.

GIS can be defined as a modern and advanced digital technology used in geographical studies as a tool for collecting, storing, processing, analyzing and displaying information in different forms according to the quality and purpose of the research. Accurate handling and safety are essential when presenting geographical features dynamically. This involves inquiring about statistical data, conducting spatial analysis, and establishing a comprehensive spatial information database related to the phenomenon under study. Additionally, it is crucial to have knowledge of appropriate and suitable land use practices to benefit the city's residents.

There is an important role of geographic information systems in studying the expansion of the city and planning its services. Since GIS is an integrated and sophisticated system that can store, tabulate, process and analyze data and information., it is applied in many projects of planning. The reduction in time and increased efficiency in studying urban expansion and planning essential services within a city is achieved through the development of future policies and programs based on scientific principles like GIS. This approach allows for expedited completion of urban expansion projects while ensuring that they are grounded in scientific foundations. (**[6].**

GIS is helpful for,

- Preparing a geographical database and providing updated and highly flexible information for all the natural and human capabilities in the city.
- Deriving information that serves planners based on the information available in the database, and preparing digital maps of various scales that provide detailed information about the urban land that can be expanded, and services established, as well as the street network, the pattern of use and a study of the reality of the city.
- Studying the expansion of the city needs huge amounts of information and data, whether it is about jobs within the city or the concentration of the population and its economic activity or the services that can be provided.
- Interpreting spatial relations, analyzing them and measuring their efficiency, and linking the phenomena in the city with each other, such as the

[6] Clarks. The Gis for Geography lark university, main treat, orceter, A,2008, p.23

concentration of the population, and the classification of land uses in the form of layers.

- Determining service problems within the city and addressing them by applying planning alternatives for expansion based on solid and realistic foundations, using GIS programs to choose the best alternative.
- Geographical information systems are used in preparing and managing databases for various surveys, such as population surveys, traffic system surveys, and economic, social and service surveys.
- Geographical information systems are used to locate service institutions within the city to know the adequacy and efficiency of the service.
- Studying and evaluating the status of service institutions (education, health, entertainment, and others).
- Follow-up on the relationship between population growth and services in order to identify deficiencies.
- Collecting quantitative and descriptive data about service institutions in the study area to benefit from them by taking appropriate decisions to develop those institutions [7].

HYPOTHESIS OF THE RESEARCH / RESEARCH PROBLEM

The hypothesis is a statement of an initial response to the research problem. The researcher attempts to develop the study's hypothesis based on the information provided in the study problem, which was represented by the following hypotheses:

1. The city has grown throughout several morphological stages.

Anti hypothesis: The city has not grown throughout morphological stages.

2. Most studies and fundamental plans failed to control rising immigration and population, which caused the city to grow and create new neighborhoods while also creating a shortage of services for the city in the future.

[7] Makram Anwar Al-Sheikh, The Use of Geographical Information Systems in Urban and Regional Planning, the First Scientific Conference on Quantitative Analysis Methods in Urban Planning for the period from December 14-16, 1987, p. 140

Anti hypothesis: Most studies and fundamental plans succeed in controlling rising immigration and population, which caused the city to grow and create new neighborhoods while also creating a shortage of services for the city in the future.

Plans have been developed to identify expansion trends in rural areas close to the basic design, where modern technologies have helped find expansion axes. The use of modern technologies, such as remote sensing and geographic information systems, has had an impact on building a geographical database to determine expansion axes in accordance with programs and designs. based on a growth in population. The primary issue stems from the rapid pace of urbanization and the challenges associated with controlling the city's growth due to factors such as migration, demographic changes, and population growth. Furthermore, uncontrolled urban expansion poses a significant challenge to essential services, placing increased pressure on their adequacy and effectiveness. In particular, areas such as Al-Dora, Karada, Kadhimiya, and Zayouna, as well as the entire governorate of Baghdad, have experienced substantial population growth that is not solely attributed to urban revolutions or regional and national urban population increases. Rather, this growth can be attributed to the overall improvement in the economy since 2003, leading to an enhanced standard of living for the population during that time and continuing until now.

Based on the information provided, the study tasks/questions can be formulated as follows:

1. To what extent does urban growth contribute to the poor level of efficiency in basic services in the study area?

2. What factors contribute to the insufficient availability of basic services in the study region, considering the size of the population and the number of neighborhoods?

3. Are there plans or initiatives to leverage modern technologies effectively in identifying expansion axes and strategically locating services within urban areas of the study region, aiming to achieve a balanced distribution of services to the population?

4. Has the type of land usage, particularly industrial use, played a role in impeding residential expansion in certain areas?

5. Do the cities, villages, and towns within the governorate suffer negative consequences due to the concentration of administrative and public services in the main city?

POPULATION AND SAMPLE

The study focused on 18 neighborhoods out of a total of 186 neighborhoods in the study area. The study area encompassed 24,650 families, as determined through a census conducted in 2009. The selected neighborhoods served as a case study, and a sample was chosen to represent the entire neighborhood, considering the homogeneity of the study community. Purposive sampling method was used in this research. Afterwards, an exploratory study was conducted for the neighborhoods included in the study. The study involved counting the streets within each neighborhood and then determining the number of housing units on each street using satellite imagery and property maps. The study also considered the proportion of sampled street dwellings and determined the number of dwellings that should be excluded from the sample. This process aimed to gather comprehensive data on the housing units within the study area and ensure the accuracy of the findings. This implies that for every five dwellings on a street, four dwellings are excluded from the sample, and the fifth and tenth dwellings are selected for inclusion. In other words, the study follows a systematic sampling approach where one dwelling is chosen from every five dwellings within each street sector. This method helps ensure a representative sample while maintaining efficiency in data collection.

SCOPE AND LIMITATIONS / DIFFICULTIES

The study will focus on the Province of Baghdad, specifically examining the urban expansion and its impact on the efficiency of services within its boundaries. The research will investigate the efficiency of various essential services affected by urban expansion, including but not limited to transportation, healthcare, education, water supply, sanitation, and waste management. The study will analyze the urban expansion and its impact on services in the Province of Baghdad over the past decade, with a particular emphasis on recent years. The research will involve collecting both primary

and secondary data from relevant sources, such as government reports, statistical data, academic literature, and interviews with key stakeholders, including government officials, service providers, and residents. The findings of this study will be specific to the Province of Baghdad and may not be directly applicable to other regions or countries. The availability and reliability of data related to urban expansion and service efficiency may pose limitations. In some cases, data may be incomplete, outdated, or unavailable, potentially impacting the accuracy of the findings. The study's time frame may limit the depth of analysis for certain aspects of urban expansion and service efficiency, as well as the ability to capture long-term trends and changes.

REVIEW OF PREVIOUS LITERATURE

The previous studies can be categorized into two groups. The first group focuses on urban studies conducted outside the governorate, encompassing local and international research. These studies serve as a robust foundation upon which the current study is built. The second group consists of geographical studies conducted within the governorate, which explore its natural and human resources, and assess the role of these resources in shaping the urban expansion and development of its major urban centers.

Country Specific Studies

Qasim Matar Abd, (2015) conducted a study on trends and determinants of urban expansion in the city of Zubair. (8) The increase in population size in Zubair has resulted in the city expanding in various directions. Through the study of human factors, an analysis of the trends and determinants of urban growth has revealed some challenges. One of the major factors contributing to urban growth is commercial activities and investment in oil within the Zubair and South Rumaila fields, which has led to an influx of population. The population of Zubair grew from 17,880 people in 1947 to 262,877 people in 2010. Consequently, the urban area expanded from 346 hectares in the old city to 3,385 hectares in 2010. Residential use accounts for 42% of urban land, but despite this high rate, there is still a housing deficit of 33%. As a result, the city has expanded

[8] Qasim Matar Abd, Trends and Determinants of Urban Expansion in Al-Zubair City, Journal of Kufa Studies Center, 2015, Vol. 1, No. 38

in various directions, with the most significant expansion occurring towards the Zubair-Safwan axis, due to its potential for further expansion. However, the spatial expansion in the study area faces several determinants that pose obstacles. The most significant determinants include the presence of oil fields, the preservation of antiquities, sanitary landfill sites, industrial areas, and transportation infrastructure.

Ismail Muhammad Khalifa Al-Issawi, (2016) analyzed urban expansion and its impact on agricultural land uses in the countryside of Al-Saqlawiyah district, Abu Sdeira district as a model city**.** [(9)] The research focused on studying the expansion of urban areas at the expense of agricultural land in the countryside of Al-Saqlawiya district (Abu Sedira district). The study involved analyzing population data, agricultural land areas, the number of housing units, and the number of families. By standardizing the scale, the research aimed to understand the extent of the gap between changes, considering the differences in scale units. This was achieved by utilizing population growth rates and the rate of change in agricultural areas. Tables and graphs were used to visualize the findings. The following results were obtained from the research: urban expansion in various forms occurred randomly, encroaching upon agricultural lands; the number of housing units experienced a significant increase, with a percentage of 114% between 1987-1997 and 71% between 1997-2012. This led to the conversion of substantial agricultural land into residential areas.

Adel Abdel Amir Abbou, (2019) analyzed urban expansion and its effects on the desertification of agricultural lands, in a case study of Abi Al-Khasib district in Iraq. (10)

Urban expansion and the encroachment on agricultural lands is a global issue faced by countries worldwide, including the study area. This phenomenon contributes to the process of desertification, which further exacerbates the problem of food security. Countries often struggle to protect agricultural lands and encourage farmers to maintain them, as the provision of food to the population is a critical measure for the political performance of governing regimes. Food has become a significant factor in global

[9] Ismail Muhammad Khalifa Al-Issawi: Urban expansion and its impact on agricultural land uses in the countryside of Al-Saqlawiyah district (Abu Sdeira) as a model. Al-Mamoun College Journal 2016, Volume, Issue 27

[10] Adel Abdel-Amir Abbou, Urban Expansion and its Effects on the Desertification of Agricultural Lands in Iraq, Abi Al-Khasib District, Study as a Model. Maysan Journal of Academic Studies 2019, Volume 18, Issue 36

policies, with some countries using it as a political weapon against others to force them to rely on imports. The deterioration of the agricultural land environment in the countryside of Abu Al-Khaseeb district, particularly after 2003, when it transformed into various urban forms, is a risk that the state must address. Implementing deterrent laws before construction begins on these lands, which are often divided into small plots with low values compared to neighboring cities, is essential. The greed of some real estate owners seeking profits exacerbates this issue. Gradually, rural areas are transformed into densely populated cities with unregulated and unplanned growth, resulting in negative effects on the agricultural environment such as land shrinkage, pollution, ecosystem disruption, and eventually desertification. These factors impact the country's food security and require significant expenditure on importing agricultural products.

To address this problem, it is crucial to use scientific planning to limit urban expansion on agricultural lands in the study area. Proper planning is necessary to combat the ongoing decrease in agricultural lands caused by urban expansion driven by population growth and rural-to-urban migration. Additionally, the establishment of new cities and investment in them can be considered viable solutions to mitigate the impact on agricultural lands and promote sustainable urban development.

Mahmoud Akash Ahmed Al-Karbouli, examined urban expansion of the city of Karbala 2021. [(11)] The city of Karbala witnessed urban and spatial growth and expansion that extended over time through three time periods according to the geographic variables that were accompanied by economic, social and administrative developments that had a key role in the growth of the city.

During the early stages, the city of Karbala occupied approximately 55.5 hectares. As the city gained administrative capacity, it experienced rapid growth and expansion beyond its surrounding walls in the second stage. The government played a role in this expansion by establishing industrial centers, such as the General Company for Phosphate Industry, which attracted workers and increased the population. The inhabited area of the city expanded to around 544.9 hectares during this phase, accommodating a population of approximately 15,224 people. In 1996, the administrative capacity of the city, which had been abolished in 1987, was restored,

[11] Mahmoud Akash Ahmed Karbouli, (2021) Urban expansion of the city of Karbala Journal of Educational and Scientific Studies, 2021, Volume 2, Issue 18

leading to further growth and expansion. The city's size and population prompted the competent authorities to integrate the villages of Suwaihel and Saada into the city of Karbala. In 2015, the city underwent a modernization process for its basic design, indicating that the city's area reached 1,325.1 hectares. The estimated population in 2018 was approximately 38,861 people.

Alaa Mahdi Saleh Al-Zuhairi, Tanzeh Majeed Hamid, conducted study on urban expansion trends in the Muqdadiya district center in 2021. The study utilized remote sensing technology and GIS to map and analyze the urbanization patterns in the area. By utilizing space-borne remote sensing data, specifically the satellite visual sensor (OLI-TIRS) from Landsat 8, the researchers were able to derive land use and land cover information for the year 2019. This allowed them to identify and assess the trends and axes of urban expansion within the study area, highlighting any discrepancies that may exist. A study by Ismail Muhammad Khalifa Al-Issawi, 2016 on urban expansion and its impact on agricultural land uses in the countryside of Al-Saqlawiyah district, Abu Sdeira district, as a model.

Studies related to Baghdad Province

hahba Ahmed Ali Al-Tamimi, (2014) conducted study on the role of urban sprawl on the uses of agricultural land surrounding the city of Baghdad. (12) The research focuses on the issue of urban sprawl and its impact on agricultural lands in the city of Baghdad. It highlights the problem of agricultural land being converted into residential or other types of construction, despite existing planning laws aimed at protecting agricultural lands. The study examines the causes and effects of urban sprawl on agricultural lands and explores ways to mitigate it through practical urban planning methods. The research problem is identified as a lack of knowledge regarding the role of unplanned urban sprawl on agricultural land uses in Baghdad. The hypothesis suggests that the more urban laws change in an unplanned manner, disregarding basic plans and experiencing population growth in specific areas, the more unplanned urban expansion and sprawl occur, resulting in a reduction in agricultural land and surrounding green areas that are beneficial to the environment.

[12] A study (Shahba Ahmed Ali Al-Tamimi, 2014): The role of urban sprawl on the uses of agricultural land surrounding the city of Baghdad

The study discusses three main factors contributing to the increase in urban sprawl: state policy and laws, population growth in cities, and poor urban planning and lack of adherence to structural plans. The objective of the research is to assess the extent of the deviation in agricultural land uses within the city's basic designs due to continuous changes in these uses. The field study focuses on a group of agricultural lands located on the outskirts of Baghdad, within the province's borders, serving as a case study to apply the research's theoretical framework in a practical planning context. The research methodology includes a historical and descriptive approach, utilizing studies from government and service institutions to examine the factors influencing urban sprawl at the expense of agricultural lands.

The study utilized aerial photographs and maps to analyze the pattern of urban expansion and its impact on agricultural lands in Baghdad. It found that the changing urban laws, population growth, and disregard for the city's basic plans contributed to the increase in urban expansion and encroachment on agricultural lands. This resulted in a higher percentage of built-up areas, a decrease in agricultural lands, and the overall expansion of Baghdad's size. The granting of building permits and the unauthorized occupation of agricultural lands were identified as factors leading to the reduction of agricultural areas and the risk of desertification. Based on the findings, the research provided recommendations to address the issue of encroachment on agricultural lands within the borders of Baghdad governorate. These recommendations emphasized the need for appropriate measures to halt the problem and solve it through proper urban planning methods. Implementing these mechanisms can help mitigate the negative effects of urban expansion and ensure the preservation of agricultural lands in the region.

Bashir Ibrahim Al-Taif, Riyadh Abdullah Al-Samarrai, Sabah Hammoud Ghaffar, conducted a study on the problems of the urban environment in Iraq, Baghdad in 2014 (13). The city of Baghdad has witnessed a wide growth in all social and economic fields, accompanied by a development and an increase in land uses within the city. This paved the way for a major urban expansion within the city. This expansion exacerbated many environmental problems, especially for low-income people, due to the rapid population increase, land scarcity, high prices and building prices inflation.

[13] A study (Bashir Ibrahim Al-Taif, Riyadh Abdullah Al-Samarrai, Sabah Hammoud Ghaffar, 2014): problems of the urban environment in Iraq, Baghdad as a model

Urban growth and the lack of interest in developing the foundations of existing infrastructure or establishing new infrastructure has exacerbated the problems that will be focused on in this research. It was and still is the old means of transportation that were prevalent in use before 2003 (the year of the American occupation of Iraq), and some of them are still used until the present time. Baghdad is also characterized by a high rate of pollution caused by dust whose concentration reaches 350-400 mcg/m3 because of the city's expansion on agricultural lands and green spaces and the lack of application of the green belt system. After the American occupation of Iraq, the spread of slums became more pronounced in cities, including Baghdad. The city is estimated to have around 255 slums housing over 600,000 people. This rapid growth of slums has resulted in several negative consequences for urban development. One significant consequence is the decline in agricultural production due to the encroachment of random settlements on green areas and agricultural lands. The conversion of agricultural lands into informal settlements hampers food production and exacerbates food security challenges. Furthermore, the environment has been adversely affected by the unregulated development activities in urban growth areas, particularly unplanned industrial activities. The improper management of sewage waste, including household, commercial, and institutional waste, along with rainwater and street runoff, poses environmental risks. The increase in population size in urban settlements also contributes to environmental challenges, further impacting the urban environment in Baghdad.

Shatha Abdul-Jabbar Younis conducted study on the effect of the uncontrolled expansion of the city of Baghdad on the canals and streams of the Tigris River, a case study: Nahr Al-Khair Al-Khair in 2010. (14) The city of Baghdad benefits from fertile land and abundant water resources, with the Tigris River dividing it into two parts and the Euphrates River passing nearby. The western side of Baghdad, known as Karkh, has a network of channels that historically provided water to the population and farmlands. However, with the urban renaissance and expansion of the city in the early 20th century, large agricultural lands were transformed into residential areas, causing some water channels to intersect with residential zones. One such channel is the Al-Khar River,

[14] Shatha Abdul-Jabbar Younis: The effect of the unstudied expansion of the city of Baghdad on the canals and streams of the Tigris River, a case study: Nahr al-Khair (Al-Khair) Journal of Al-Mustansiriya Center for Arab and International Studies 2010, Volume, Issue 31

which used to run parallel to the Tigris River on the western side of Baghdad, providing water to the surrounding areas. In 2002, a decision was made by the government to bury the river and replace it with a pipeline for water supply. This decision was not well-received, as the river had played a vital role in providing water for over 1200 years.

The excessive focus on urban development and the establishment of large residential neighborhoods without proper attention to other aspects of development resulted in imbalances. Many neighborhoods were built before the completion of necessary infrastructure, leading to new problems and potentially wrong decisions in attempting to address them, such as burying the Khar River and other channels. The aim of the study was to examine the impact of urban expansion on these water channels, with the Al-Khar River serving as a case study. The study also involved analyzing the city's expansion as a method to understand the implications of this growth. It sought to shed light on the consequences of urbanization and the importance of preserving water channels and providing a waterfront and green belt for the city, considering the significant expansion and transformation of agricultural lands into residential areas.

Regional Studies

Shakir Mubarak conducted a PhD thesis on Primary and Secondary Education and its Relationship to Development in the Western Region at Faculty of Arts, University of Rabat 1990). This study focused on urban, economic, and social development, with an emphasis on economic and developmental aspects. It examined the quantitative, qualitative, and spatial aspects of primary and secondary education variables in the western region.

Khalif Mustafa Hassan Ghorabiya conducted a doctoral thesis titled "Spatial Analysis of Services in the City of Irbid" at the College of Arts, University of Baghdad in 1995. The study examined various services, including educational services, and explored their development in relation to the overall city development. The thesis also made several recommendations for the optimal distribution of these services among the different neighborhoods of the city.

Amin Ali Muhammad Hassan conducted a Master's thesis titled "The Evolution of Educational Services in the City of Aden" at the College of Education Ibn

Rushd, University of Baghdad in 1995. The study focused on the quantity and types of services provided by kindergartens, middle schools, and secondary schools in Aden. It examined the changes in these services over time, their spatial distribution, and the patterns and shapes of distribution within the city. The study explored distributions and provision of educational services in Aden.Nasser.

Abdullah Al-Saleh conducted a study titled "Some Aspects of Educational Geography for the Province of Makkah Al-Mukarramah, Kingdom of Saudi Arabia" under the Kuwait Geographers Society in 1983. The study focused on the growth of public education for boys in the province of Makkah and the geographical distribution of educational institutions. It concluded that there was an uneven distribution of educational services within the province. The study adopted the method used by Saleh Falih Hassan in Iraq.

Enas Ghazi Muhammad Ali conducted a master's thesis titled "Population and Education in the Kingdom of Saudi Arabia" at the Department of Population Studies, Faculty of Arts, University of Jordan in 1988. The study focused on the characteristics of the population and the development of education in Saudi Arabia between 1982 and 1985. While it primarily falls within the domain of population studies, the study also examined the distribution of teachers, students, and schools in Saudi Arabia.

Mahmoud Ali Atef conducted a PhD thesis titled "Geography of Primary Education in Yemen" at the College of Education, Al-Mustansiriya University in 2003. The study focused on analyzing the geographical distribution of primary education in Yemen and how it varied over different time periods.

Nadim Shamsin conducted a master's thesis titled "Constructing a School Map for the Qalamoun Region" at the Faculty of Education, University of Damascus in 1978. The study was a field study in spatial educational planning and aimed to create a map of schools in the Qalamoun region.

The research conducted by the Teachers Syndicate in Iraq, titled "The Development of Secondary Education in Iraq as a Step to Meet the Challenges of the Twenty-First Century" in 1997, explores the future of education in Iraq. The research focuses on the significant factors that contribute to the development of economic, social, and cultural progress. Secondary education is highlighted as an important factor in

supporting the overall development process, serving as a complementary stage within the educational system.

Abdul Wahed Abdullah Ayyad Al-Husseini conducted research titled "Towards the Development of Basic Education in the Arab World to Face the Challenges of the Twenty-First Century." The research was submitted to the Arab Teachers Union in Sana'a in 1997 during the educational symposium held at the union's headquarters. The research focuses on the methods of basic education in the Arab Republic of Yemen and explores how Arab expertise can be utilized to address the challenges and shortcomings in education.

Dr. Youssef Muhammad Ali Hatem Al-Hathal conducted research titled "Evaluation of the Geographical Distribution and Spatial Variation of Secondary Education Services in Diyala Governorate" at the College of Education Ibn Rushd in 2001. The research focused on assessing the geographical distribution and spatial variations of secondary education services in Diyala Governorate.

International Studies

The year 1972 marked the beginning of significant interest in education and the application of geographical research methods to diagnose and address its problems. This interest was particularly evident in the United States, where journals started publishing studies on this subject. Researchers from the University of Manchester also addressed educational services from a geographical perspective during this time. In 1972, the University of Bath conducted a conference titled "Why Not A Geography of Education," further highlighting the growing recognition of the importance of studying education through a geographical lens.

Following the initial interest in educational geography in 1972, several articles continued to be published in 1972 and 1973. These articles primarily focused on the disparities and distribution of education among white and black populations. Since that time, American books and magazines have dedicated a section specifically focused on education, encompassing research and geographical information relevant to the field. It's

worth noting that this field is distinct from geography education, highlighting the intersection of geography and education as a separate area of study.(15)

As a result of the growing interest in educational geography worldwide, the Economic World Atlas, which had been published in 1954 and 1965 without including maps related to education, was reprinted in 1972 for the fourth time. This edition of the atlas finally included four maps showcasing the educational attainment levels worldwide, the establishment of educational institutions, and the geographical distribution of illiteracy. The inclusion of these maps reflected the recognition of education as a significant factor in global geography and the importance of representing it in geographic publications.(16)

Dr. Alan L. Backer (17).- conducted research entitled A geography of Education in The United States Some Preliminary Consideration Study Applied Social Geography. The study responded to the call for geographers and researchers to focus on the geography of education and explore geographical phenomena from a spatial perspective. The researcher's findings indicated regional variation in educational achievement, with higher levels of achievement observed in the western regions of the United States and lower levels in the southern regions.

A research in the French language, principles of educational planning and conditions for success was conducted in1970 (Planification de Education : les condition de reussit G.G. Ruscoe , unesco) (18) This study includes the method used by the planners on how to set school building programs and the location of the size of the existing schools. The research has established the main methods of success and how to invest educational planning techniques to put the planners in a better position.

The research conducted by **Robert Ceipl**, titled "Educational Planning on a Territorial Basis," focused on the application of geography to supplement educational

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15 Saleh Fulaij Hasan Al-Hiti ((Views of Educational Social Geography)) published in the Book of Readings of Social and Applied Geography, edited by Dr. Abdullah Al-Manea, University Student Library, Makkah Al-Mukarramah, Saudi Arabia, 1407 AH, p. 176

16 Hamid Alwan Muhammad Al-Saadi, Spatial Distribution of Higher Education Universities and Institutions in Iraq, A Study in Applied Geography, PhD thesis, College of Arts, University of Baghdad, 1997, p. 32, (g.m).

17 Arabha d. Abdullah Ali Al-Manea in the Book of Readings in Social and Applied Geography, University Student Library, Makkah Al-Mukarramah, Kingdom of Saudi Arabia, 1407 AH, pp. 139-162.

18 A.L. Backler "Ageography of Education in The United States: Some Preliminary Consideration" in R.N. Taaffe and J.od Land Geographical Horizons. Kardall Hunt Publishing Company Dubaguelowa, 1977

planning in eleven German provinces. The study aimed to identify the extent to which geography can contribute to educational planning. The researcher's findings revealed disparities in the provision of educational services, with certain areas receiving only minimal services. These areas were referred to as "educational deserts" due to the limited access to quality educational resources in those regions. [19]. Indeed, the studies mentioned can be considered part of socio-civilizational geography due to their focus on the socio-cultural aspects related to education and its spatial distribution. The research conducted by **Markl Dury in 1973** focused on determining the locations of black and white schools and highlighting the contrasts between these locations. The study specifically examined three small units in the Mississippi area where black populations were concentrated during the 1940s and 1970s. The research likely explored the spatial aspects of racial segregation and educational disparities in those specific regions during that period. ([20])

Markl Gautier conducted a research study titled 'Number of Enrollees and Their Distribution in Schools in France.' This research is part of French geographical research and was published in Annales de Géographie in 1964. The study aimed to analyze the enrollment numbers and their distribution in schools across France, including an examination of the reasons for the distribution discrepancies R.K. Home conducted a research study titled "Urban Development Councils of Nigeria: The Case of Kano" in the year 1986. The objective of the research was to examine the city of Kano in northern Nigeria. Kano is characterized by a high population density, with a population ranging from 6 to 7 million, and it has served as a prominent commercial center for thousands of years within Nigeria. The research delved into the factors influencing the city's development, with a particular focus on the involvement of the federal government in urban development initiatives. It highlighted how this involvement, although to some extent beneficial, also resulted in the neglect of certain activities and the influence of land division policies and political pressures. The division and distribution of land were identified as crucial factors in the urban development process for any country. Like other

[19] Corald Vones and Raymond. H. Rayba, Why not Ageograohy of Education "The Journal of Geography Vol.XXI, No.3, 1972, P.138.
[20] Kembe Ronald Hope, (Urbanization and Economic Development in the Third World), Cities, 1986.

second-world countries, Nigeria faces various challenges that hinder its development processes.

Kembe Ronald Hope conducted a study titled "Urbanization and Economic Development in the Third World" in the journal Cities in 1986. The study examined the recent trends of urbanization in third world countries and explored the key elements of urban development, particularly the impact of population growth and rural-urban migration. The study highlighted the social challenges associated with urbanization, such as high unemployment rates, housing shortages, traffic congestion, and environmental pollution. The researcher presented important policies aimed at managing rapid urbanization. It was noted that governments of third world countries have struggled to effectively plan for the growth of cities. Therefore, the study emphasized the need to adopt successful policies and strategies to manage rapid urbanization. These strategies include equitable distribution of services to the population, creating new job opportunities in cities, improving transportation and construction services, developing the rural sector, encouraging investments, and enhancing infrastructure development.

Atash, F. Beheshtina conducted a study titled "The Urban Dimension of the Population Explosion in Iran" published in the journal Cities in 1994. The study examined the impact of rapid population growth in major cities in Iran on administrative and organizational aspects, with a specific focus on the city of Isfahan. Isfahan holds significant importance due to its central location within the region and its role as an economic hub in the country. The study proposed strategies to address these issues by implementing population control measures in these areas and developing land management plans. It explored the possibility of establishing satellite cities near Isfahan, which could serve as centers for industry and alleviate pressure on services and employment opportunities. The redistribution of the population and the prevention of encroachment on updated organizational structures were highlighted as important measures to keep pace with new developments. Furthermore, the researcher recommended the application of the concept of satellite cities to other countries experiencing population pressure in major urban centers. This approach could help mitigate the challenges associated with population growth and urbanization.

Organization of Thesis

The thesis is organized into the following sections:

Introduction: Provides an overview of the research topic, its significance, objectives, and scope.

Chapter 1: Methodological Framework: Discusses the research methodology and approaches employed in the study. It outlines the data collection methods, analysis techniques, and any tools or technologies utilized.

Chapter 2: Theoretical Framework: Presents the theoretical foundations and concepts relevant to the research topic. This chapter explores existing literature, theories, and frameworks that inform the study.

Chapter 3: Results: Presents the findings of the research, including data analysis, interpretation, and any empirical evidence obtained. This chapter may include tables, graphs, or other visual aids to support the results.

Chapter 4: Conclusions, Recommendations, and Suggestions: Summarizes the main findings of the study, draws conclusions based on the results, and provides recommendations and suggestions for future research or practical applications. This chapter may also address any limitations or challenges encountered during the research process.

List of Sources: Provides a comprehensive list of all the references, sources, and materials consulted and cited throughout the thesis, following a specific citation style or format.

The study was structured in a logical manner, addressing the research problem, hypotheses, and goals. The thesis comprised four research chapters, preceded by a summary, table of contents, tables, maps, figures, and visuals. The introduction provided an overview of the research, including the methodology, sample selection methods, review of previous studies, and explanation of key concepts and terminology. The study area's location, limitations, and factors of emergence and development were also discussed.

The second chapter focused on the urban system, urbanization, and urban expansion. It provided an overview of modern techniques used in the study, such as remote sensing, global positioning systems, and geographic information systems. The

chapter also delved into the demographic characteristics and economic activities of the study area, highlighting basic community services and economic aspects.

The third chapter presented a spatial analysis of urban expansion and prospects in the study area, utilizing GIS technology. This chapter was divided into two sections. The first section analyzed the adequacy and efficiency of basic services through a field study. The second section focused on spatial analysis, evaluating the spatial suitability of urban expansion using GIS software. It discussed important considerations for future urban expansion, identified appropriate indicators, and provided future directions for urban expansion based on assessing the spatial suitability.

The thesis concluded with the fourth chapter, which included the research findings, conclusions, and recommendations. The list of references and an English summary were also provided.

1. HISTORY AND ORIGIN OF BAGHDAD

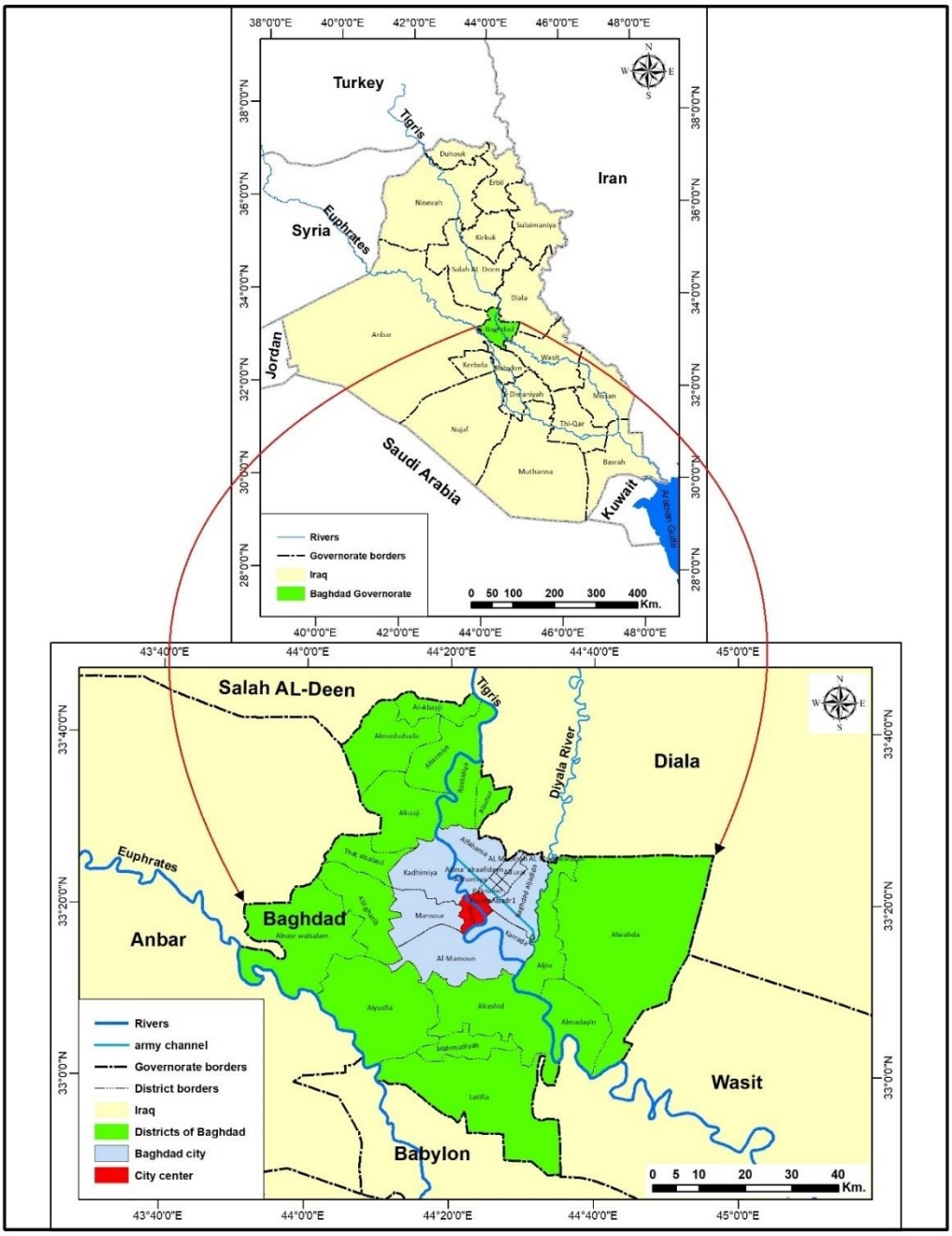
1.1. Location

The geographical coordinates of a region, in terms of latitude and longitude, play a crucial role in understanding the natural and climatic factors that shape the utilization of land by humans. By considering the region's position, it becomes possible to determine the environmental conditions, which in turn significantly influence land use patterns. **([21])** The location is the decisive factor in determining the characteristics of the land, as it is what determines the natural land feature (soil, its fertility), its social importance (type of ownership) and its economic advantage (type of use).

The province of Baghdad is located between latitudes 48°32'N and 46°33'N and longitudes 51°43'E and 56°44'E. It constitutes approximately 1% of the total area of Iraq, amounting to 435,052 km2. The province is bordered by Salah al-Din Governorate to the north, Diyala Governorate to the northeast and east, Wasit Governorate to the southeast, Babil Governorate to the south, and Anbar Governorate to the west. Within the Baghdad governorate, there are ten districts, namely Al-Mahmudiyah, Al-Tarmiyah, Abu Ghraib, Al-Kadhimiya, Al-Karkh, Al-Rusafa, Al-Adhamiya, Al-Sadr Al-First, Al-Sadr Al-Second, and Al-Madain, as depicted in Map 1 and 2.

The mathematical location of the study area is derived from longitude and latitude, and based on Mercator's transverse projection The aim of the study is to know the functional relationship of the city center with the surrounding areas that lie outside the administrative city limits, and that the study of the site is one of the important matters in urban studies, because the geographical location has important impact on the urbanization process with its characteristics that distinguish it from other sites, In addition to its importance in analyzing the geographical characteristics of the city’s location, and its relationship to the surrounding areas, which represent the best environment for the city’s expansion and development, as it deals with it with interrelationships embodied by the need of each (location and position) for the other.

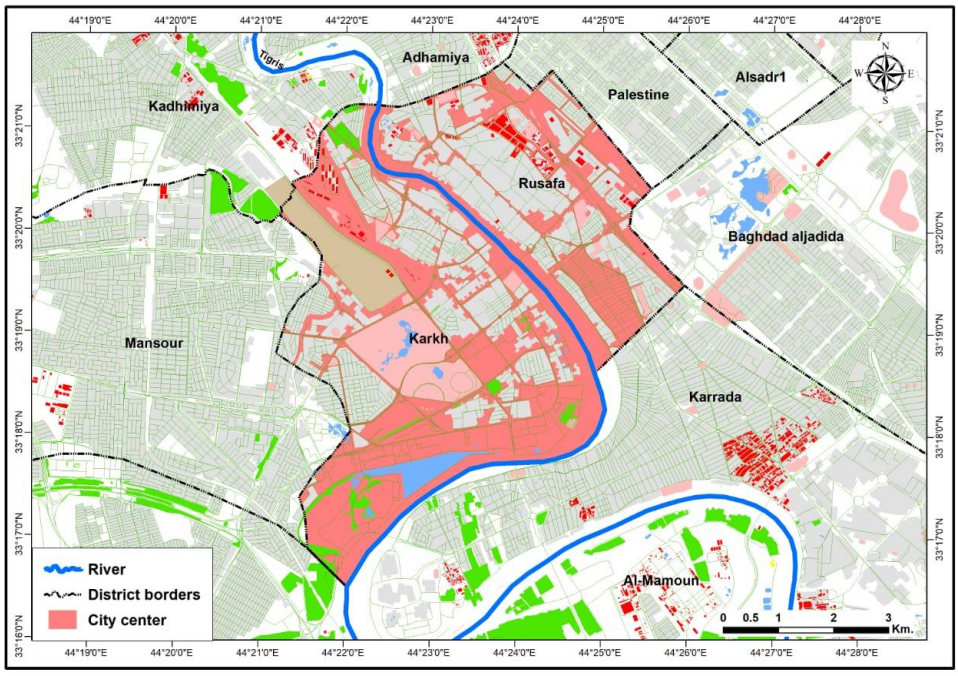
18. Ministry of Planning, Central Statistical Organization, Annual Statistical Abstract, for the year 2018.



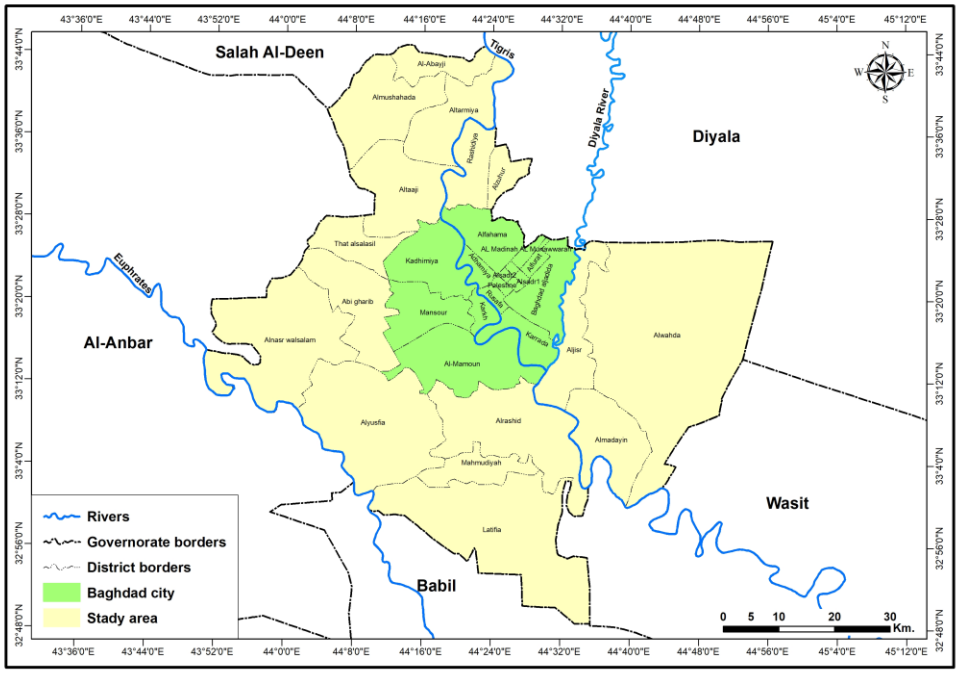
Map 1: Location map of Baghdad

Variations in the internal structure, land uses, and urban characteristics of the city throughout history express the city's development and expansion trends in each developmental stage. These changes are influenced by historical developments, location factors, and their impact on economic, social, planning, and service factors in the study area. Therefore, the geographical-historical method is used to trace human settlement, urban expansion, and the stages of the city's development over time. This method is complemented by the inductive approach and the examination of archaeological sites.

In this context, the city of Baghdad and its archaeological sites have been studied extensively.



Map 2: City center of Baghdad



Map 3: Administrative units of Baghdad city

1.2. The Foundation of Baghdad City

Al-Tabari mentioned a story in his book about the construction of Baghdad. He stated that Caliph Abu Jaafar Al-Mansur faced a challenge regarding the caliphate while he was in Hashemite opposite Ibn Hubayrah city. This city was built around the palace of Yazid bin Hubayrah Al-Fazari, the governor of Iraq during the era of Marwan bin Muhammad, the last of the Umayyad caliphs. Ibn Hubayrah was one of the cities located on the pilgrimage road near Kufa and was situated opposite Kufa. When the people of Kufa revolted, Al-Mansur did not feel safe and decided to relocate to Baghdad. He then went to Mosul and eventually returned to Baghdad, stating that this location was suitable due to its proximity to the Tigris River, which provided easy access to food and other travel necessities. The site was strategically chosen to meet the army and the caliph's various requirements. Al-Mansur marked the city's boundaries and appointed leaders for each quarter **(22)** .

When al-Mansur decided to relocate from the Hashemite to his previous headquarters, he gathered his soldiers and led them towards a place near Wasit. He was accompanied by both civilians and soldiers, as he believed that a location far from the river's path would not adequately meet the soldiers' needs. While passing through a site next to the Tigris River, al-Mansur reached a bridge where he prayed the afternoon prayer. It was at this moment that he decided to plan his city in the same location. **(23)**.

The narration of the monk, the orchard, and the monastery, along with the establishment of the core of Baghdad by Caliph Al-Mansur, has been transmitted by numerous historians in various versions. This narrative often contains elements of legendary prediction, which are commonly associated with monks and clerics in general. However, it should be noted that these accounts are sometimes embellished and should be approached with caution. One of the narrations mentioned in this context is cited by Ibn al-Taqqaqi..**(24)**

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[22] Al-Tabari, Abu Jaafar Muhammad, History of Nations and Kings, investigation: Abu Suhaib Al-Karmi, House of Ideas, Riyadh, Dar Al-Fikr, 1, 2009, 1547

[23] Brigadier General, Taher Muzaffar, Baghdad, the rounded city of Mansour, Baghdad University Press, Baghdad, 1968, p. 128

[24] Ibn al-Taqtaki, Muhammad Ali, al-Fakhri in Royal Literature and Islamic Countries, Dar Sader, Edition 1, Beirut, Lebanon, 2001, p. 161

According to the narration, the monk prophesied that a person named Muqlas would build Baghdad. When Caliph Al-Mansur was searching for a location to build his city, he came across the monk. The monk inquired about the name of the person who intended to build the city. When informed that it was Abdullah bin Muhammad, nicknamed Al-Mansur, the monk stated that he was not the one mentioned in their books as the builder of the city; it was supposed to be Muqlas. Upon hearing this, Al-Mansur dismounted his beast, prostrated, and declared that he was indeed Muqlas. The narrative further explains that Al-Mansur acquired the nickname Muqlas in his youth, but due to negative associations with the name, he changed it to Miqlas. From that point on, he ordered the city to be built. While there are reservations about the authenticity of such narrations, they are mentioned to highlight the fact that the idea of establishing the city of Baghdad engaged the minds of various thinkers and writers, approached from different perspectives. Some took a scientific approach, while others explored alternative methods, such as this story, which emphasizes the significance of the idea of creation itself. **(25)**

1.3. Reasons for building Baghdad

The construction of cities and capitals is often influenced by various factors, including political, natural, economic, religious, spiritual, and social considerations. The importance of a city or metropolitan area increases when these factors interact and contribute to its development, placing it in a distinguished position on the regional, national, or global map. This holds true for the city of Baghdad, as its construction was motivated by a combination of factors that propelled it to become one of the leading cities in the world over time. Specialists have identified several key factors that played a role in the establishment of Baghdad, which can be outlined as follows:

1.3.1. The Political Factor

Kufa held great significance for the Banu al-Abbas clan as a key stronghold in their conflict with the Umayyad state. It served as a hub for their call to seize power and

[25] Al-Hamawi, Shihab Al-Din Abu Abdullah Yaqut bin Abdullah Al-Roumi, Mu'jam Al-Buldan, Dar Sader, Beirut Edition: Second, 1995, p. 370.

played a crucial role in their struggle against the Umayyads. The support from Kufa became evident during the intense clashes between the Abbasids and the Umayyads. Recognizing this support, Abu al-Abbas al-Saffah, the first caliph of the Abbasid dynasty, chose Kufa as his base and a stronghold for the revolution. After the revolution's victory and the Abbasids assuming control of the government, Abu Jaafar succeeded Abu Abbas as the caliph. He established his residence in Kufa after returning from Anbar. This further solidified the central role of the Iraq region as the primary center of power for the Banu al-Abbas.**(26)**

An analysis of the political factors reveals that the Caliph who assumed power faced limitations in selecting their headquarters. The Levant was not a viable option as it remained loyal to the Umayyads. Similarly, choosing Khorasan as the seat of the Caliphate was impractical due to its geographical distance from the center of the Islamic world, despite the support of its people for the Abbasids. The Hijaz region was also unsuitable as a capital since its people had largely withdrawn from active participation in the political movement. The revolutionary political motivation had subsided among them. **(27)**

The location of Baghdad possessed certain characteristics that made it desirable for the establishment of a city or capital. During that time, it was advantageous to have cities or capitals situated in the central region. This was because transportation was relatively slow, and the ability to quickly respond and react was crucial in maintaining power and resolving conflicts. If the capital was in a remote area, it would impede the swift reaction that a Caliph or Commander would need to undertake in the event of a rebellion or any other urgent situation. Therefore, the central location of Baghdad allowed for better strategic positioning and facilitated rapid responses when necessary. **(28)**

One of the political factors that led to the construction of Baghdad and the departure from Kufa was the split between the Alawi House (Umayyads) and the Abbasid House after Abu Jaafar al-Mansur assumed the caliphate. Due to political

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[26] Al-Maqdisi, Abu Abdullah Ahmad, the best divisions in the knowledge of the regions Author: Abu Abdullah Muhammad bin Ahmad Al-Maqdisi Al-Bashary Publisher: 1- Leiden 2- Dar Sader, Beirut 3- Madbouly Library Cairo, third edition, 1999, 137

[27] Al-Samarrai, Yunus, Mosques of Baghdad, Dar Al-Warraq, London, I 1, 2011, p. 280.

[28] Al-Tabari, History of Al-Tabari, pg. 1477

differences, the people of Kufa showed a tendency towards the Alawi House. In response, al-Mansur made the decision to distance himself from Kufa and establish a new city, which became Baghdad. By doing so, he aimed to create a fresh center of power that would be more aligned with the interests of the Abbasid House.

1.3.2. Military Factor

The emergence of the opposition movement known as the Rawandiya revolution during Al-Mansur's caliphate had a significant impact on the decision to establish a new capital. The Rawandiya revolution was led by a faction of the Khurmiya sects, primarily associated with the village of Rawand in the Isfahan districts. This group held unconventional beliefs, such as reincarnation, and declared a revolution against Al-Mansur. The revolution posed a threat to Al-Mansur's life, despite not being particularly strong. This incident raised concerns about the safety and stability of the Hashemite region as the seat of the caliphate. It became evident to Al-Mansur that the Hashemite lacked adequate fortifications to protect against potential large-scale and organized armed attacks. Given Al-Mansur's military experience gained during the Abbasid Revolution, he could identify sites that met the necessary military considerations and standards for safety. Consequently, he sought to locate a site that would provide greater security for the new capital, thus leading to the selection of Baghdad.**(29)**

As previously mentioned, one of the key factors that Al-Mansur considered when choosing the site of Baghdad was its suitability as an army camp. He emphasized to his advisors that the location, situated between the Tigris and the Euphrates rivers, would prevent enemies from surprising him. He believed that the rivers would serve as a natural defense line for the city, making it difficult for invaders to reach it. Al-Mansur further asserted that the Abbasid army would be able to thwart any attempts by attacking soldiers to construct crossings or bridges across the rivers. This strategic advantage provided an additional layer of protection to the city, enhancing its defensibility and making it a favorable choice for the capital.

[29] Al-Tabari, History of Al-Tabari, pg. 1475

1.3.3. The Economic Factor

Abu Jaafar Al-Mansur was nicknamed (Al-Dawaniqi Abu Al-Dawaniqi) [30], a term that refers to checking accounts and balances, and he was called that because of his miserliness, and stinginess. This matter indicates that a person like him with these features and specifications is fully aware of the importance of factors.

The economic aspect played a significant role in the decision to build Baghdad as the new capital. As the capital of the vast Islamic state, Baghdad held a strategic position that would grant it dominance over key trade routes. Its chosen location, situated between the eastern and western regions of the Islamic world, provided a central ground that facilitated trade and commerce. By establishing Baghdad in such a position, the Abbasid rulers aimed to harness economic benefits and maximize their control over trade networks. The city's favorable location allowed for easier access to various regions, enabling it to become a thriving center of commerce, attracting merchants, traders, and goods from both the eastern and western parts of the Islamic territories.

1.3.4. The Health and Natural Factor

Experts highlight that during that era, many caliphs and leaders preferred to select cities in flat and open areas. As previously mentioned, when Al-Mansur arrived at the chosen site of Baghdad and spent the night there, he expressed his satisfaction with the pleasant environment. He found the location to be favorable in terms of its natural beauty and the fulfillment of his desires. The flat terrain not only provided aesthetic appeal but also had practical advantages, including ease of construction, accessibility, and the potential for urban development. In addition to the military and economic factors, the health and natural aspects of the chosen site contributed to Al-Mansur's favorable impression.

The chosen site for the establishment of Baghdad is located to the west of the Tigris River, in an area where the Tigris and Euphrates rivers come close together. This site is known for its flat and easily accessible terrain, extending within sight without being restricted by natural obstacles. This land fulfills the preferences of the Arabs and

[30] Al-Tabari, History of Al-Tabari, pg. 1475

Muslims who were accustomed to living in open and unconfined areas, whether on islands or in cities surrounded by flat lands.[31]

Based on the factors and reasons discussed for choosing the site of Baghdad, it is evident that the selection process was highly proficient. The city possessed a combination of specific characteristics that contributed to its significance. Over time, these factors and specifications played a crucial role in shaping the growing importance of Baghdad as a capital in Islamic history and even in the broader scope of human history. The researcher recognizes the significant impact of these factors on the historical significance of Baghdad. The city's role in shaping Islamic civilization and its contributions to various fields of knowledge, arts, and governance further cement its importance in human history. As a result, the selection process of the city site proved to be effective and instrumental in establishing Baghdad as a prominent capital.

1.4. Initiating the Construction of The City

Al-Mansur enlisted all available expertise in his state to accomplish his great project. He summoned engineers and construction experts from every corner of his realm, as well as individuals knowledgeable in military strategy, land division, and various trades and crafts. The estimated number of professionals and artisans involved reached nearly one hundred thousand. Supervising the construction process was entrusted to trusted individuals of merit, justice, jurisprudence, integrity, and engineering knowledge. These competent and morally upright individuals were selected to ensure the smooth progress of the construction of Baghdad. [32]

Al-Tabari recounts that when Al-Mansur embarked on the construction of his metropolis, he commanded the gathering of skilled engineers, workers, builders, and craftsmen from various cities such as Al-Sham, Basra, Kufa, and others. It is said that their numbers exceeded a hundred thousand. Al-Mansur inspected the city's plan and instructed that cotton seeds be placed along the city's lines, which were then doused with oil and set on fire. This demonstration was witnessed by prominent figures such as

[31] Al-Hiti, Sabri, Planning the City of Baghdad through Antiquity, Al-Mawrid Magazine, Volume Eight, Issue Four, 1979, p.9

[32] 10- Al-Hiti, the same source, p. 10

Mahrez, Imran bin Al-Wadah, Shihab bin Kathir, and Al-Hajjaj bin Artah, alongside several astrologers and account holders, including Ibrahim bin Muhammad Al-Fazari, an astronomer, linguist, mathematician, translator, philosopher, and others. Ample provisions were provided to the workers, and instructions were given to prepare the necessary materials, such as firing bricks. .(33)

During the commencement of the construction, Abu Jaafar al-Mansur personally placed the first brick in his hand. He uttered the words, "In the name of God, praise be to God, and the land to God Almighty. He bequeaths it to whomever He wills of His servants, and the end is for the faithful believers." The building of the city began in either Jumada al-Ula 145 AH (early August 762 AD) or according to some accounts, Rabi al-Awwal 141 AH (July 758 AD). Different historians hold varying opinions on whether the planning date or the actual start of construction marks the true beginning. Completion of the construction took approximately four years and two months..(34)

The name "Baghdad" carries significant historical and cultural connotations, given its past as the capital of the Islamic world. Exploring the city's history involves understanding the meaning and implications of its name, as well as examining different interpretations that have emerged over time. The name "Baghdad" has ancient origins, indicating its deep-rooted authenticity and historical significance. Historical records suggest that the name was mentioned as "Bakdada" during the reign of Hammurabi in the 18th century BC, as evidenced by a tablet discovered in the area known today as Tel Abi Haba. Additionally, a list found in Nineveh, dating back to the 7th century BC, contains the name "Bak-da-du," further attesting to its ancient existence. (35)

In addition to the ancient references, there are different theories regarding the origin of the name "Baghdad." One theory suggests that it may have been derived from "Baal Gad," meaning the camp of Baal, which was a Babylonian army camp and a storage facility for weapons and military equipment. Another theory proposes a Chaldean origin, tracing the name back to the word "Baldada," derived from the name of the Chaldean god "Dada." Supporters of this view believe that a significant event or

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33 Al-Moussawi, Talal, Al-Kazimin City, a religious tourist teacher, Ahl Al-Bayt University Journal, No. 12, Karbala, 1982, p. 136

34 Ibn al-Taqtani, previous reference, p. 157.

35 Al-Rawi, Taha, Baghdad City of Peace, Hindawi Foundation for Education and Culture, Cairo, 2014, p. 13

epic took place at this location during the reign of Bakhtansar, resulting in the construction of the city as a commemoration of the victory over his enemies.([36])

Over time, Baghdad rose to prominence in political, scientific, and cultural spheres, solidifying its position as a global capital. Consequently, the city acquired multiple names throughout history. Here are some examples mentioned in various sources:([37])

A - The city of Al-Mansour was also named after its founder, Caliph Abu Jaafar Al-Mansur

B - The City of Peace or the House of Peace, and it is said that the Caliph named it by this name, and it was said that it included the Peace Palace or that it was likened to Heaven, according to some people. official

C - Al-Rawha', named after the openness of the course of the Tigris River and the relief of its course due to the flatness of its land d- Al-Zawraa was named so because of the Azurar (the inclination and deviation) of its outer doors from the interior. Baghdad lies on the winding banks of the Tigris River

D - The rounded city, so called, is the urban pattern that Abu Jaafar Al-Mansour was keen to build on, and it is the circular shape, which was considered a new form and pattern in the urban pattern of cities and metropolises.

1.4.1. Baghdad City Planning

Indeed, the diverse opinions regarding the origin of the name Baghdad reflect the cultural richness and historical significance associated with the city. The various interpretations and linguistic influences highlight the importance placed on understanding the connotations and meanings behind its name. The continuous evolution and adaptation of the name throughout different periods demonstrates its enduring significance and the continuous interest of specialists in unraveling its historical and cultural significance. This serves to emphasize the distinct position that Baghdad holds throughout its rich history.

[36] Al-Hamawi, previous reference, pg. 457
[37] The Dean, previous reference, p. 161

As previously mentioned, historical accounts describe how Al-Mansur implemented specific measures to mark the lines of his city, including using trenches and placing cotton balls or seeds on those lines, which were then ignited to make the lines more visible. The city's foundations included two walls and a deep trench surrounding it, following the plan devised by specialists. Baghdad was designed in a circular shape, earning it the name "Round City." While there were other round cities in different regions, such as Hatra in Mesopotamia and Ma'rib in Yemen, Baghdad stood out due to its unique planning and construction methods implemented by Al-Mansur. The city's circular shape, as well as the nature of its planning and construction, set it apart from other rounded cities of that time. ([38])

The city of Baghdad was carefully planned and included a wide trench and multiple walls for protection. Four gates were constructed, each with its own name: the northwestern gate known as Bab al-Sham, the southwestern gate called the gate of Kufa, the southeastern gate known as the gate of Basra, and the northeastern gate called Bab al-Sham. The gate leading to Khorasan was named Bab al-Dawla. The round shape of Baghdad, along with its four equally sized gates, was a remarkable architectural and planning innovation of its time. A deep trench was dug around the city, featuring high-tight grooves built with strong and colorful brick and masonry, which can be compared to cement in terms of strength. Water was channeled into this trench from the nearby river known as Karkhaya. ([39])

[38] Al-Hiti, op. cit., p16
[39] Al-Azami, Khaled Khalil, Mural decorations in Baghdad, Dar Al-Rashid, I 1, Baghdad, 1980, p. 345

2. PHYSICAL AND HUMAN GEOGRAPHY OF BAGHDAD

2.1. Physical Geographical Characteristics

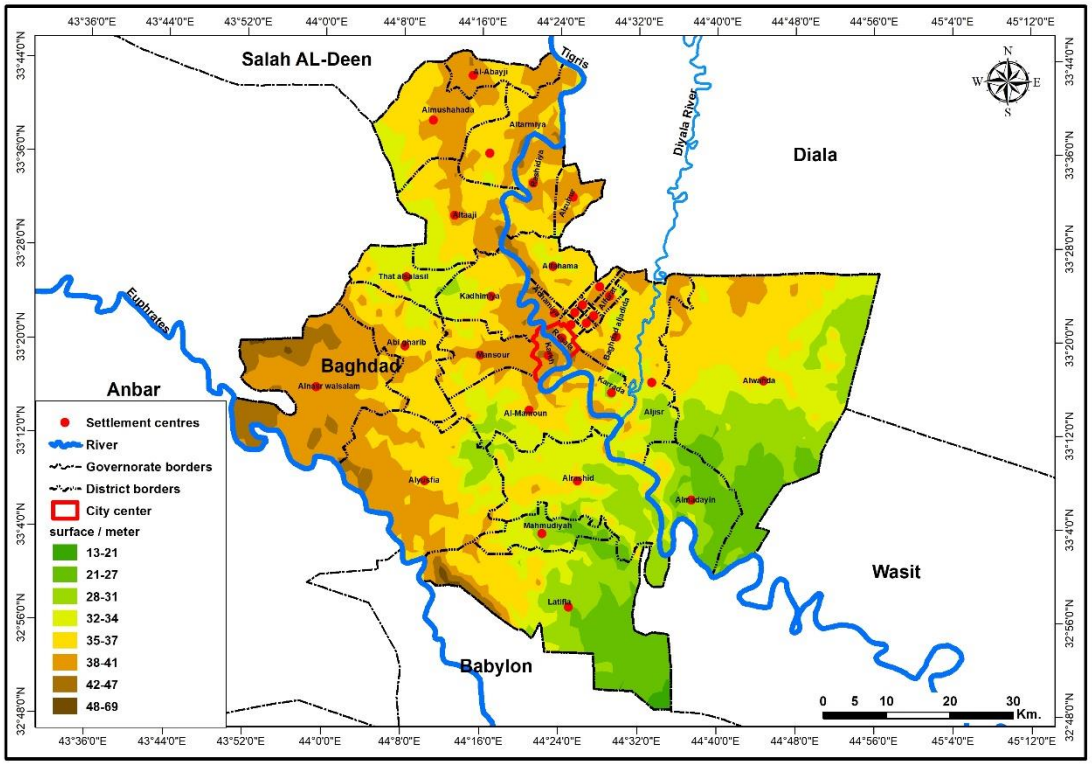
2.1.1. Elevation and Landforms

The terrain plays a significant role in urban planning and land use. In areas with steep slopes, it becomes challenging to construct buildings, and structures located above the water pressure level in the pipe network may face difficulties in accessing water. Additionally, the orientation of the land in relation to wind and sunlight is crucial for proper land development. Residential buildings are often planned with their primary facade facing south to optimize sunlight exposure. Furthermore, areas with steep terrain pose challenges for accessibility, both by car and on foot, making it difficult to establish an efficient network of transportation **(40)**.

The Baghdad Governorate is situated in a sedimentary plain, characterized by its predominantly flat terrain and a gradual slope from north to south. The surface elevation ranges from 20 to 42 meters above sea level, with the highest lands located on the eastern side. A portion of the governorate exhibits some local elevations resulting from ancient and modern irrigation channels. These elevations are in the form of longitudinal hills, reaching a height of no more than 6 meters, which can be observed at the outskirts of the region. Examples include the Al-Wahda project in the Al-Madaen district, north of Khor Abu Ghraib in the Abu Ghraib district, north of Khor Alexandria in the Al-Mahmudiyah district, and the western area of the Tigris River in the Al-Taji district of Al-Kadhimiya district. Please refer to Map 3 for a visual representation.

[40] Al-Shami: Salah Al-Din, 2000 AD, Human Development is the Pillar of Planning, Manshaat Al-Maaraf, Alexandria, p. 27

(25) The Ralfh parsons Eng Go, Ground Water Resources of Iraq Vol,11 ,1957,PP.(10-11).
26-Abbas Fadel Al-Saadi, Baghdad Governorate, A Study in Agricultural Geography, first edition, Dar Al-Risala, Baghdad, 1976, p. 12



Map 4: Elevation map of Baghdad, source: from the researcher's work (DEM) digital elevation model at a scale of 1:30 meters, 2020

The surface characteristic is recognized as one of the most significant natural features enabling the growth and expansion of urban areas within the governorate's cities. The absence of rugged terrain and natural barriers has facilitated the unrestricted development and expansion, promoting smooth movement and functional connectivity between cities and neighboring regions, as well as with the central city of Baghdad. This is evident through the establishment of numerous cities and urban areas, often at the expense of agricultural land. The surface condition of the governorate offers favorable conditions for future expansion, emphasizing its importance in shaping and determining the governorate's future growth patterns and directions.

2.1.2. Soil

The soil factor, particularly its composition and structure, plays a crucial role in determining suitable urban uses. The soil structure directly influences the bearing capacity of buildings constructed upon it. Therefore, understanding the composition and characteristics of the soil is essential for ensuring the stability and safety of the built

environment. **(41)** Areas designated for the construction of multi-storey buildings must possess strong and capable soil. Despite advancements in construction and architecture, the durability of the soil structure remains a significant factor influencing urban land use. Soil surveys play a vital role in determining and regulating land use by considering natural controls. These surveys involve the classification of soils based on geological aspects, landforms, and the underlying rock materials that contribute to soil formation. The properties of soil can vary depending on the type of rock from which it originates. For example, soils derived from limestone tend to be rich in calcium and are generally preferred over soils derived from acid rocks or rocks with high iron and aluminum content. Additionally, the grain size of the original materials affects soil permeability and porosity, which in turn influence its ability to retain water and facilitate adequate drainage **(42) (43).**

2.1.3. Climate

Climate plays a vital role in shaping the distribution of population within urban spaces, which are the key components of human settlements. Favorable climatic conditions are crucial for human comfort, mental well-being, and the activities individuals engage in on the ground. Climate is among the natural characteristics that significantly impact the nature of urban land use, not only in terms of architecture but also in terms of morphology. Furthermore, climate influences the location of cities, as they have distinct local climates that vary between their centers and outskirts. This variation is due to the presence of different land uses such as roads, bridges, industrial projects, various modes of transportation, open green areas, and water-covered recreational places. These elements collectively contribute to the unique microclimates within cities, shaping the overall urban environment [44].

[41] Allam: Ahmed Khaled, 1998, Town Planning, Arab Renaissance House Press, Cairo, p. 136
[42] Wahiba, Abdel-Fattah Muhammad 1972, Geography of Urbanism, Dar Al-Nahda, Lebanon, p. 34
[43] Al-Banna, Ali, Applied Geography (content - development - method), Dar Al-Fikr Al-Arabi, Cairo, 2003, p. 59.28.
[44] Azhar Muhammad al-Sammak, Salah Hamid al-Janabi, Hashem Khudair al-Janabi, Land Uses Between Theory and Practice, Directorate of Dar Al-Kutub for Printing and Publishing, University of Mosul, 1985, p. 55

This temperature variation[45] across different locations significantly influences the land uses within each specific climate (Ministry of Transport, Iraq, 2021). Certain uses are specific to climates, while others may be absent within the same cities. Regarding the main climate elements, such as temperature, the range observed average over a period of 11 years (2009-2018) was between 10°C and 37°C. In terms of average total rainfall in the governorate, it ranged from 0 mm to 33 mm. Wind speed varied between 0 m/s and 4 m/s. Additionally, the average relative humidity of the governorate fell within the range of 21% to 66%. Please refer to Table (1) and Figure (1) for a visual representation of these climate elements.

Table 1: Average of climatic elements of the Baghdad station from 2009-2018

Months	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**Annual rate**
average temperature/C°	10	13	18	24	30	34	37	36	32	26	17	12	24
Average wind speed m/s	3	3	3	3	3	4	4	3	3	3	2	3	3
Rainfall rate mm	19	14	16	13	7	0	1	0	0	17	33	20	11.7
Average relative humidity %	66	55	45	37	29	23	21	23	28	39	58	64	40.6

Source: The Ministry of Transport, the Iraqi General Authority for Meteorology, unpublished data, average for the period from 2009-2018.

[45]Abd al-Fattah Muhammad Wahiba, Geography of Urbanization, Dar al-Nahda al-Arabiya, Beirut, 1972, p. 67

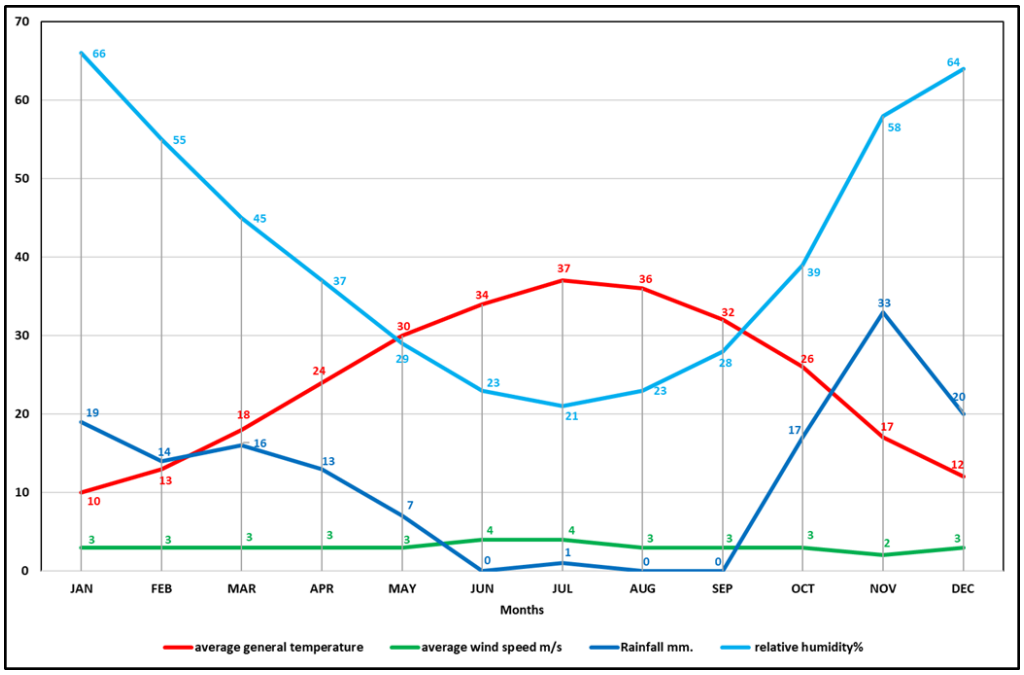


Figure 1: Climatic elements of the Baghdad station from 2009-2018

2.2. Human Geographical Characteristics

The study of human characteristics within cities holds significant importance in urban geography. This is because humans directly shape the aspects of the Earth's surface [46] and their natural environment through various economic, social, and service-related skills and activities. Moreover, humans can influence and modify natural factors to utilize and adapt the environment to serve their needs, leading to the establishment of human settlements. Therefore, the development and expansion of cities are closely linked to the size of the population and the rate of its growth over time periods.[47] The urban centers are the nucleus of large population gatherings within limited spatial frameworks, and within the two contexts of location and location, they practice multiple activities and functions, and the population component is of great importance because it is the factor benefiting from those function The role of human characteristics in the urban

[46] Osama Yas Munawar Obaid, Spatial Analysis of Urban Expansion Trends in Baghdad Governorate Using Modern Technologies in 2021, p. 33

[47]Reda Abdul-Jabbar Salman Al-Shammari, "The Spatial Distribution of Population in Al-Qadisiyah Governorate and the Factors Influencing It and Its Effects," Journal of Geographical Research, University of Kufa, College of Education for Girls, Issue (6), 2005, pp. 35-86

land uses is manifested through the interaction of the spatial relations of the natural and human characteristics in any administrative unit on the surface of the earth.[48]

2.2.1. Population Growth

Rapid population growth poses a significant challenge to the world, particularly in developing countries, where the population is increasing at a rapid pace due to natural growth and continuous migration. This population growth is closely linked to the phenomenon of accelerated urban and rural expansion, which is a result of the growing population occupying more spatial areas. This horizontal expansion often occurs at the expense of agricultural land, as the increased population puts pressure on natural resources, particularly agricultural land. **([49])**

We observe that three variables—births (fertility), deaths, and net migration—represent population growth, whether positive or negative. In terms of their size and distribution (2), due to the phenomenon of rapid growth in city sizes brought on by an increase in population and high rates of population growth, which puts more strain on urban space and contributes to its expansion, which is frequently accomplished by horizontal expansion within it at the expense of adjacent agricultural lands.

It must be based on the findings of the general population census in 1997 AD and the population projections for the year 2018 AD in order to demonstrate the changes that have occurred in the population growth in the Baghdad Governorate. Table (2) shows the population growth rates for Baghdad Governorate* according to the (engineering progression) formula approved by the United Nations.**

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[48]B.J. Garner " models of urban Geagraphy and settlement location"socio – Economic models in Geagraphy. Edited by Richard J.chorly and peter Hagget – methuen- London. 1970. P .354

[49] Sabata, Urban Planning, Lecture 8 on 2/3/2017, University of Mosul, First College of Engineering, Department of Architecture, Third Phase

(*) Note: Wherever the word (Baghdad Governorate) appears, in population studies and urban analyses, respectively, it is meant here (study area) and includes administrative units outside the boundaries of the Municipality of Baghdad.

(**)The population growth rate was extracted according to the following equation: R = - 1) x 100, as:
r = annual growth rate, Po = population at the first census, P1 = population at the last census, t = number of years between the two censuses, see:
United Nations, Demographic year book, New York, 1980, P32

Table 2: The annual growth rates of the population of Baghdad governorate for the period 1997-2018

Year	Growth Rate	
	Baghdad	Iraq
1997 - 2009	1.76	3.7
2009 - 2018	1.95	2.06

Source: 1. annual growth equation. 2. The Ministry of Planning, the Central Statistical Organization, the results of the general census of Iraq, the part of the Baghdad governorate, Table 21, for the year 1997, the counting and numbering census for Iraq. 2009 population projection statistics for the year 2018.

As observed in the previous table, the following explanations apply to each time period and the overall population growth of the Baghdad Governorate: From 1997 to 2009: The population growth rate during this period was just 1.76%, which is below Iraq's growth equation of 3.7%. The economic embargo on Iraq, along with the accompanying unrest and military operations, significantly affected the population growth rates in the Baghdad Governorate. Since the last census conducted in 1987, the population growth rates experienced a sharp decline of 3.54%. The difficult economic and social security conditions in the governorate, as evidenced by the net migration rate of -300,198 people, also contributed to the slower population growth rate[50].

Period (2009-2018): This period witnessed high growth rates, with the population growth rate reaching 1.95%. This rate is considered very high and rapid compared to the previous period's growth rate of 1.76% and is close to Iraq's overall population growth rate of 2.06%. Societies with growth rates ranging between 1.9% and 2.5% are considered to have very rapid growth[51]. The introduction of new technologies and innovations, along with migration factors resulting from the displacement of residents from unstable regions towards the Baghdad Governorate, played a significant role in this population increase. The improved security and economic conditions after 2009 resulted in a net increase of 149,590 people.[52]

[50] Ministry of Migration and Displacement, Programming Department and Information Department, for the year 2009 unpublished data.
[51]Pierre George, "Population Geography," translated by Dr. Samouhi Extraordinary, University Thought Library, Aweidat Publications, Beirut, Lebanon, 1970, p. 90.
[52]3)) The First National Survey of the Displaced in Iraq, Ministry of Displaced and Migrants, Information Department, 2014, pp. 14, 74.

2.2.2. Population Growth at different Administration Levels

We notice a large discrepancy in the growth rates at the level of the administration of the study area through our review of the annual growth rates of the population of Baghdad Governorate according to its administrative units that lie outside the borders of Baghdad Governorate. Baghdad Municipality (1997-2018) as shown in Table (3). Administrative units that had strong growth rates began to appear, while others had growth rates that appeared negative, and this can be explained as follows and for each period:

Period (1997-2009): Table (3) demonstrates a clear and significant variation in population growth throughout this time, with the Tarmiya district's central business district holding the top position at the level of the study region with a 4.9% growth rate. Al-Rasheed sub-district, on the other hand, held the lowest position with a growth rate of (-0.3%). In addition to administrative changes, the availability of jobs in those administrative units, and an increase in the population's propensity to buy land and construct housing units to suit their prices for middle-class people, especially the high level of income for them after 2003 AD, so they became desirable areas of the population, population growth rates also result from natural increase and the migration factor. As a result of deteriorating security conditions at the time and administrative changes, particularly in the Al Rashidiya district, some administrative units saw a decline in (negative) annual growth rates because they were among the regions that saw displacement operations.

Period (2009-2018): Table (3) shows fluctuations in growth rates, as we find an increase in some of them and a decrease in others, as the district of Al-Zuhur, the center of the Abu Ghraib district, and the center of the Mahmudiyah district occupied the first place, as the growth rate reached (2). 2%), while the lowest ranks were occupied by the same Al-Salasil Al-Mashahya, Al-Abaiji, Al-Rashidiya, Al-Yousifiyah district, Al-Latifiyah and Al-Rasheed district. As a result, the bordering provinces and regions have started to draw people.

Table 3: Annual growth rates of the population of Baghdad Governorate according to the administrative units of the study area for the period 1997-2018

Administrative units	Population growth 1997-2009	Population growth2 2009-2018	Administrative units	Population growth5 1997-2009	Population growth6 2009-2018
Alzuhur	0	2,2	Alyusfia	1.9	1.9
Altarmiya	4,9	2	Rashidiya	1.9	1.9
Unit	4,6	2	Latifia	1,4	1.9
Al-Abayji	4,2	1.9	Abi gharib	1.3	2,2
Aljisr	4	2	That alsalasil	0,23	1.9
Almushahada	4	1.9	Alnasr walsalam	0,9	2
Almadayin	3,7	2	Al -Rashid	-0,3	1.9
Mahmudiyah	3	2,2	-	-	-

Source: The annual growth equation 2. The Ministry of Planning, the Central Statistical Organization, the results of the general census, for Iraq, the special part of the Baghdad governorate, table 21, for the year 1997, the enumeration and numbering statistic for the year 2009, the population projection statistic for the year 2018**.**

2.2.3. Population Distribution and Density in Baghdad

There are large modern urban centers that occupy only small areas of land, in contrast to the case with large areas of land that are characterized by a small population. The population's density and number distribution also vary from region to region. The population may be dispersed in one region and found concentrated in another. Population density is one of the metrics that significantly affects how cities grow and expand during their many stages, so that it reaches one or two persons per square kilometer[53] .The various natural factors, such as the surface, climate, soil, and water, as well as the social, economic, and political human factors, which started to have an increasing impact on the concentration of the population in some areas and the variation in this distribution from one region to another, control the form of distribution[54].The population density and significance of any administrative unit are shown by any high percentage of the people there. This causes it to occupy more space, whether in urban or

[53]Balsam Samih Salih Tayeh, Geographical Distribution of the Population in Palestine (West Bank and Gaza Strip), Master Thesis (unpublished), College of Arts, University of Baghdad, 2003, p. 41
[54] Abbas Fadel Al-Saadi, Baghdad Governorate, Study in the Geography of Population, Al-Azhar Press, 1st edition, 1976, p. 25.2-

rural areas, in order to secure the services and activities that come from the increase, which necessitates urban expansion activities in both[55]. It also demonstrates to urban planners the extent to which cities require a large enough plot of land for urban expansion in order to lower their high density.

According to the administrative units included in the study, Table 4 shows that the population distribution and density in the Baghdad Governorate fluctuate from year to year. This can be described as follows for each year of the study, Year 1997: There is a noticeable disparity between the rise and reduction in population numbers and densities during this year, both at the level of administrative units and the population of the governorate, as shown in Tables 4 and the maps provided in Figures 4 and 5. The Al-Nasr and Al-Salam districts had the greatest population, totaling 125,310, while the Al-Salasil district had the lowest population, totaling 14455. Baghdad had a population of 994,445; the Al-Nasr and Al-Salam district had the highest population, totaling 125,310 (an increase of 14,455 people). This increase can be attributed to natural growth, the presence of numerous industrial, administrative, and service institutions, as well as migration factors, since these areas are active agricultural regions. Additionally, administrative changes and the difference in area between the Al-Nasr and Al-Salam sub-districts and the That Al-Salasil sub-district have contributed to the increase in population size. The Al-Mahmudiyah district had the highest population density, at 1,122.2 people/km², while the Al-Wahda sub-district had a lower density of 106.6 people/km². The increase in population density in Al-Mahmudiyah is due to natural population growth, an influx of immigrants, and its relatively smaller area compared to the concentrated population residing there. Conversely, the lower density in Al-Wahda is a result of its larger area compared to the number of residents settled in it.

The population of Baghdad Governorate, according to the results of the enumeration and numbering, reached 1,555,698 people, which represents a numerical increase compared to the 1997 figures of 561,253 people. This disparity in population growth and decline, as well as density, is evident in Table 4 and the maps provided in Figures 4 and 5. This discrepancy can be attributed to the recent establishment of the governorate. During this period, the Al-Abayji district had the lowest population,

[55]Mohamed Sobhi Abdel Hakim, Urbanization in the Arab World, Arab Organization for Culture and Science, League of Arab States, Press, Egyptian Public Authority for Libraries, 1978, p. 8

amounting to 12,820 people. The overall population increase is attributed to natural growth and improved economic conditions, such as a higher level of per capita income and the concentration of economic and service activities. Migration to more stable regions, particularly the periphery, also played a role, especially during and after the year 2003. Furthermore, radical changes in the total area occurred due to administrative border adjustments and the inclusion of additional administrative units (such as Al-Abayji, Al-Mashada, and Al-Tarmiya district center). The population density was 365 people per km², with the Al-Zuhur sub-district having the highest density at 3,898.8 people per km² and the That Al-Salasil sub-district having the lowest at 105 people per km². It can be concluded that the population density increased this year due to a combination of factors, including natural growth, improved economic conditions, higher living standards, increased urban land prices, and limited availability of land within the city of Baghdad. Consequently, people dispersed to the outskirts, resulting in higher population density.

Year 2018: Based on Table 4 and maps 4 to 5, it is evident that the population numbers and density continued to increase from the previous year. The population increased in all administrative units, resulting in increased pressure on the available space. The estimated population reached 1,862,935 people, representing a numerical increase from the 2009 figure of 307,237 people. The Al-Zuhur district had the highest population, totaling 218,099 people, maintaining its top position for the second consecutive time. Conversely, the Al-Abaiji sub-district remained in the lowest position for the second consecutive time, with a population of 15,149 people. The population density reached 438 people per km², while the Al-Zuhur district had the highest density at 4,741.3 people per km², and a region with lower density registered 124 people per km².

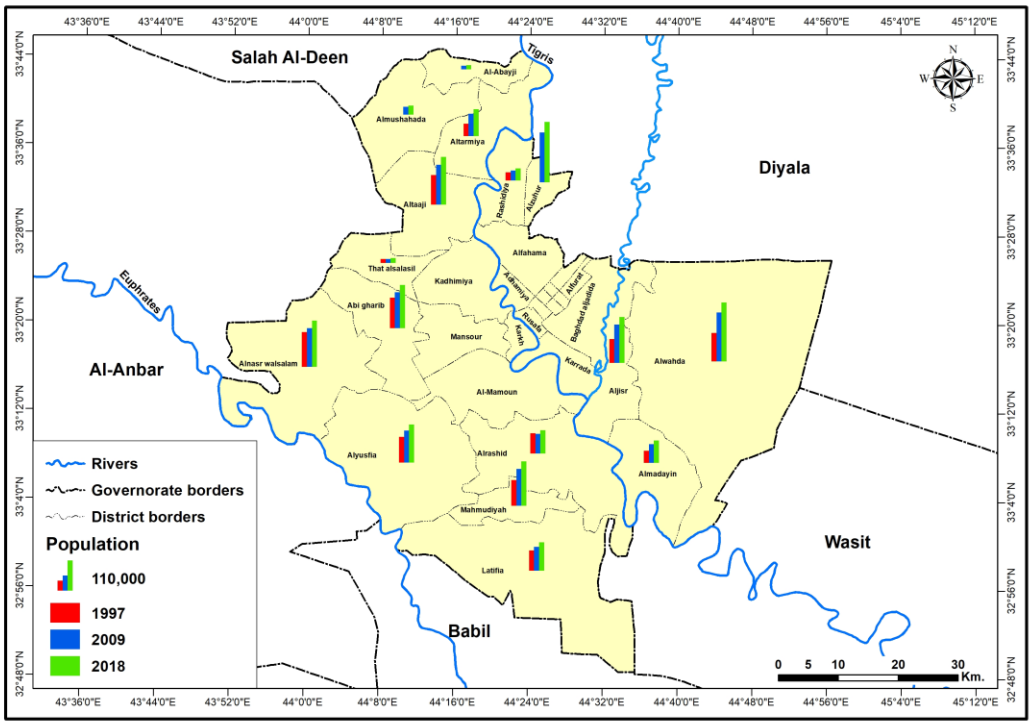
The continuous increase in population size within the province (the administrative units within the study area) has resulted in significant pressure on its spatial capacity. This can be attributed to natural growth and migration, which have played fundamental roles in altering the population distribution in Baghdad. Especially after 2003, Iraq, and particularly Baghdad, faced poor security conditions, along with other governorates. These unfavorable circumstances, especially after 2013, led to displacements of people both to and from these areas, including the Baghdad governorate. Consequently, the population distribution in the administrative units

experienced noticeable changes. Approximately 149,590 individuals had been relocated to the governorate by 2015, accounting for 19.24% of the total number of displaced people across the governorates. On the other hand, the number of displaced people from the governorate amounted to 51,338 individuals, representing 6.6% of the total number of displaced people in the governorates. The number of displaced families in the Baghdad Governorate reached 29,323, accounting for 19.5% of the total number of displaced families, while the number of families evicted from the Baghdad Governorate amounted to 59,479 families, representing 6.3% of the families relocating outside the governorate. As a result, there has been an increased demand for land, leading to the expansion of urban areas within cities.

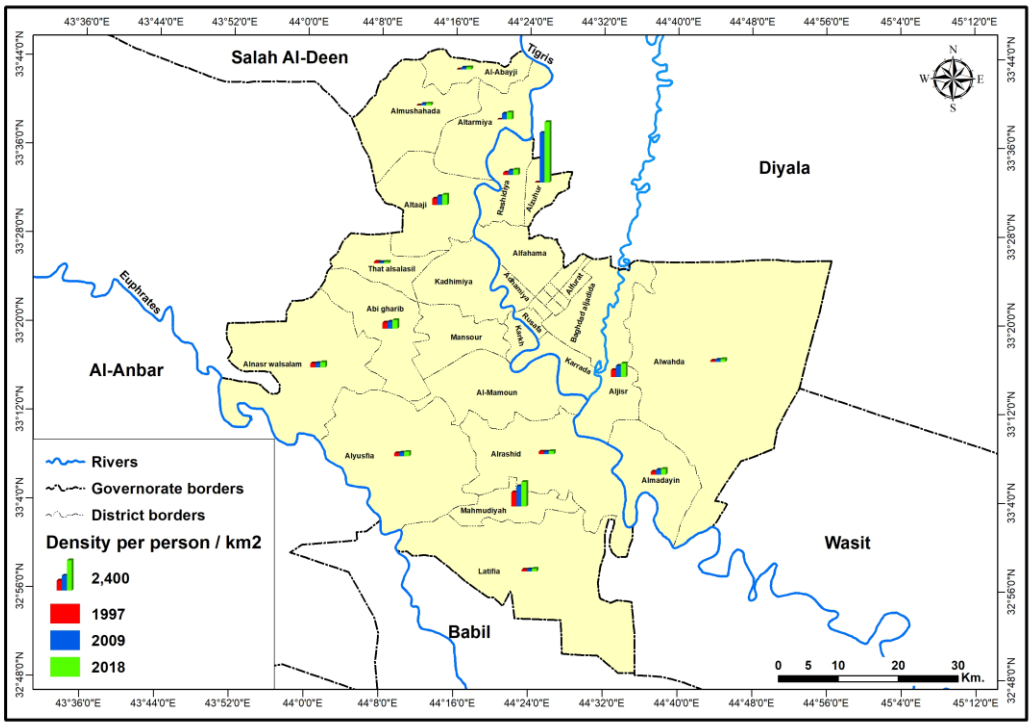
Table 4: Population distribution and density in the study area for the years 1997-2009-2018

T	Administrative unit	1997			2009			2018		
		population	Space km^2	General density Nessma/km^2	population	Space km^2	General density Nessma/km^2	population	Space km^2	General density Nessma/km^2
1	Rashidiya	29345	151	194,1	36691	105	349,4	43678	105	416
2	Alzuhur	0	0	0	179345	46	3898,8	218099		
3	That alsalasil	14455	107	135	14866	141	105	17567	46	4741,3
4	Altaaj	106556	215	495,6	143979	215	669,7	171717	141	124
5	Mahmudiyah	93146	83	1122,2	133725	83	1611,1	160965	215	798,7
6	Youssoufia	92486	410	225,6	115592	410	281.9	137046	83	1939,3
7	Latifa	73015	498	146,6	86031	498	172,8	102226	410	334,3
8	Al -Rashid	72871	357	204,1	70490	357	197.5	83767	498	205,3
9	Abu Gharib	110263	234	471,2	129229	234	552,3	155852	357	234,6
10	Alnasr walsalam	125310	408	307,1	139942	408	343	167216	234	666
11	Altarmiya	44707	0	0	80612	174	463,3	96292	408	409,8
12	Almushahada	0	0	0	28508	216	132	33688	174	553,4
13	Al-Abayji	0	0	0	12820	92	139.3	15149	216	156
14	AL Madinah	43641	175	249,4	67797	175	387,4	80936	92	164,7
15	Aljisr	86146	156	552,2	138631	156	888,7	165839	175	462,5
16	Unit	102504	946	106,6	177440	946	184,4	212898	156	1063,1
TOTAL		994445	3756	264	1555598	4256	365	1862935	4256	438

Source: Republic of Iraq, Ministry of Planning, Central Statistical Organization, results of the general census, for Iraq, the part related to Baghdad Governorate, for the year 1997-2009-2018



Map 5: The distribution of population density in Baghdad governorate for the years 1997-2009-2018(*)



Map 6: population density in Baghdad governorate for the study years 1997-2009-2018 (**)

2.2.4. Reasons of Population Growth in Baghdad

2.2.4.1. Migration from the Countryside to the Cities

The migration of rural populations to cities is driven by factors such as the low standard of living in rural areas and the high costs associated with agriculture. These circumstances push many farmers to abandon their lands and seek better livelihoods and employment in urban areas. However, this process of urbanization and the expansion of urban lands pose significant threats to the ecological environment. The increasing influx of people from rural to urban areas further intensifies the demand for agricultural land on the outskirts of cities, which is then utilized for various purposes including housing, services, the establishment of industrial clusters, and other activities. **(56)**

2.2.4.2. Economic Factors

Economic factors significantly influence the utilization of land, particularly through an individual's use of their owned piece of land. In the urban land market, each plot of land carries a specific value or price based on its location within the overall land use pattern. Certain locations hold higher value in terms of their utility, such as being more conveniently situated in relation to commercial markets, workplaces, and recreational areas. As a result, their land prices reflect this advantage compared to other plots. Prices tend to decrease as the distance from the city center and main roads increases. However, as a city expands and becomes more complex, the value and use of land undergo changes. The value of land varies with its proximity to activity centers, and this value directly impacts the intensity of development. With urbanization, each

[56] Hassan, Abdel Qader Saleh, The Geographical Basis of the Problem of Desertification, Dar Al-Shorouk and Distribution, first edition, Amman 1989, p. 110

(*) Source: From the work of the researcher, relying on the Ministry of Water Resources, the General Commission for Survey, the Division of Map Production, the administrative map of Baghdad Governorate, at a scale of 1:250,000, for the year 2020. Source No. 2 is added with it: it is the number of the table that was relied upon in mapping.

(**) Source: From the work of the researcher, relying on the Ministry of Water Resources, the General Commission for Survey, the Division of Map Production, the administrative map of Baghdad Governorate, at a scale of 1:250,000, for the year 2020. Source No. 2 is added with it: it is the number of the table that was relied upon in mapping.

inner area extends into adjacent regions, leading to the abandonment of original activities in favor of new ones. The extent of this expansion depends on the rate of economic activity growth and population increase.

2.2.4.3. Industrial Activities

Industrial activity plays a fundamental and important role in influencing the rates of development and growth of urban areas as well as the pattern, features and trends of this growth in certain sections of the cities of the governorate, which is directly linked to the process of urban expansion. The relationship between industries and the demographic movement of a particular segment of the population, which is taken from two aspects (within and outside the boundaries of the Secretariat), is used to explain the impact of industry with regard to the issue of urban expansion in the province of Baghdad. It contains huge industrial sites that housed medium and large-scale businesses in the mechanical, construction and food industries. Many of these companies later went into military action, and suffered embargoes that lasted for most of the 20th century, as well as subsequent insecurity after 2003 AD. The indirect effect that industry has on drawing the rural population to urban areas and the areas nearby is represented by the need for labor that these industries have as a result of the emergence of numerous small-scale, localized factories and workshops that are contained within urban areas. As a result, its effect on drawing people to the area and boosting migration to it emerged, as agriculture is no longer as important to it as it once was, particularly in light of the events of 2003 AD, and the population's orientation toward cities satisfies needs that some rural areas still lack in terms of infrastructure services. In this context, the number of large industrial establishments in the province of Baghdad reached (46) establishments out of the total industrial establishments in the province of Baghdad, amounting to (105) establishments, and the number of workers in them reached about (16492 people) (1), which were represented by (dairy industry, engineering industries, And construction industries, food industries, tanning industry, leather, gas and brick factories), as well as small enterprises (2), and as in Table (5).

Table 5: Distribution of large industrial establishments according to the administrative units of the study area In Baghdad Governorate for the year 2018

T	Administrative unit	The number of the facility	%	Number of employees	%
1	Altaaji	6	13,04	3772	22,87
2	Mahmudiyah	2	4,35	241	1,46
3	Al -Rashid	13	28,26	449	2,72
4	Abi Gharib	7	15,22	5753	34,88
5	Alnasr walsalam	5	10,87	1475	8,94
6	Altarmiya	6	13,04	4559	27,64
7	Unit	7	15,22	243	1,47
the total		46	100	16492	100

Source: Depending on the Ministry of Industry and Minerals, Directorate General of Industrial Development ,Unpublished data, for the year 2018. 1-Ministry of Planning, Central Statistical Organization, Industrial Statistics Directorate, Large Establishments Statistics, published data, for the year 2018. 2-Ministry of Industry and Minerals, General Directorate of Industrial Development, unpublished data, for the year 2018.

2.2.4.4. Agricultural Activities

Being central to the three pillars of sustainable development, agriculture plays an important role in the life of cities and their surrounding areas. Regarding the economic aspect, it boosts the GDP and acts as an important magnet for investment. In environmental terms, they help protect biodiversity, slow desertification, and expand agricultural land areas, while in social terms, they ensure food security and employment prospects for the majority of the rural population. Large portions of the study area in the province of Baghdad are significant agricultural areas known for their historical antiquity and constitute an agricultural region in which economic feasibility is available. This economic activity was aided by the study area's geographic location, the availability of water sources, fertile soil, the flatness of the land, and the significant demand for its products by the local population, as shown in the map (1–13). By (5.8%) in the Baghdad Governorate, and the governorate had roughly (24053) farmers, or (8.5%) of all the farmers in Iraq. (1)

In addition, in recent years, the phenomenon of transforming arable lands into urban areas has become one of the features of the urban crisis in the cities of Baghdad governorate, as a result of the imbalance of urban-rural relations, the high prices of rents and housing within the city of Baghdad and cities, and the cheapness and availability of land in surrounding areas and the surrounding countryside. The loss of these agricultural lands was reflected in the change in the economic composition of the population, and this is evident in the economic activity of ton residents of the surrounding areas and adjacent to the cities in Baghdad Governorate, as a percentage of the number of the population working in agricultural activities decreased significantly, and the orientation of work towards other economic activities through shops Retail, factories and industrial workshops, and despite the reclamation of vast areas of land, the reclaimed land does not reach the quality and fertility of the land that was exploited in the construction of housing units, and the settlement of various uses of land on it, and these factors in their entirety, allowed the exacerbation of the problem of random urban expansions on large parts of agricultural land.

3. CONCEPTUAL FRAMEWORK

3.1. The Concept and Definitions of Urbanization

Urbanization is derived from the Latin word "urbs," which means city. Linguistically, urbanization refers to the process of becoming urban or the development of urban areas. From an idiomatic perspective, urbanization can be defined as the spatial organization aimed at creating a specific system within a city. This is necessary because cities often exhibit disorganization and imbalance in terms of functional spatial arrangements. The accurate and comprehensive definition of urbanization is challenging because it encompasses various aspects of human life and requires the study of multiple areas. Its goal is to achieve consistency, efficient use, and optimal utilization of urban space and its components to enhance the well-being and convenience of the population. Urbanization involves a combination of economic, social, and environmental measures. (57) Urbanization can be defined as the process of designing and developing cities to ensure the provision of three fundamental elements: housing, work, and recreation. .(58)

Harvey argues that urbanization is an integral part of the capitalist system. Cities are not just places where economic activity occurs; they are shaped by and, in turn, shape economic processes. This concept is explored in his book, "The Urbanization of Capital: Studies in the History and Theory of Capitalist Urbanization" (1985). Harvey popularized the idea of "the right to the city," which asserts that all citizens have a right to actively participate in and shape the development of urban spaces. This concept is elaborated in "Rebel Cities: From the Right to the City to the Urban Revolution" (2012). He introduces the concept of "accumulation by dispossession," which refers to how capital and powerful interests expropriate resources and assets from the public or less powerful groups. This idea is discussed in various works, including "The New Imperialism" (2003). Harvey's concept of the "spatial fix" explores how capitalism copes with economic crises by reorganizing production and investment geographically. This concept is found in "The Limits to Capital" (1982) and "The Condition of Postmodernity" (1989). Harvey emphasizes the uneven and unequal development of cities and regions under capitalism. He explores this idea in his book "Spaces of Capital:

[57] Khalaf Allah Bu Jumaa, Al-Omran and Al-Madina, Dar Al-Huda, Ain Melilla, 2005, p. 12 -18
[58] Khalaf Allah Bu Jama'ah, for a reference previously mentioned, pg. 13

Towards a Critical Geography" (2001) and "The Enigma of Capital: And the Crises of Capitalism" (2010). Harvey's work is deeply rooted in Marxist theory, particularly dialectical materialism. While not a specific work, his engagement with Marxist ideas underpins much of his analysis and is present in many of his writings and lectures. Throughout his career, Harvey has contributed significantly to the political economy of urbanization, examining how economic forces intersect with urban development and spatial organization. His various books and articles, including "The Urban Experience" (1989) and "Social Justice and the City" (1973).

Walter Christaller's theory posits that settlements or central places serve as hubs that provide goods and services to the surrounding population. These central places are arranged in a hierarchical order based on their size, range, and functions. Larger central places offer a wider range of goods and services and have a larger market area. While Central Place Theory primarily deals with the spatial organization of settlements and their economic functions, it indirectly relates to urbanization by illustrating how urban centers develop and interact within a region. Urbanization involves the growth of cities and changes in population distribution, and Central Place Theory helps us understand how these urban centers function in relation to each other and the rural areas they serve. It's worth noting that Central Place Theory is a simplification of reality and has been critiqued and modified by subsequent scholars to better account for the complexities of urbanization and regional development. Nonetheless, it remains a foundational concept in urban and regional geography.

Urbanization refers to the process by which a population adapts to and interacts within its surrounding environment, regardless of whether it is urban or rural. It encompasses the complex interplay between housing, population dynamics, various activities, and the overall environmental context. These four elements—housing, population, activity, and environment—are integral components of urbanization, shaping the social, economic, and environmental dynamics of a given area .(59) Translating urbanization into the Latin language, an old French word whose usage remained the same in Latin even in its meanings and took the form of an adjective in order to preserve the separation between the two antonyms, city and country. Another

[59] Mustafa Madouki, Urban Form, Bachelor Thesis, College of Science and Technology, Department of Architecture, Mohamed Khider University, Biskra, 2003, p. 5

position took the character of self-politeness and behavior as the name given to those who live in cities ([60])

The term urbanization also encompasses the phenomenon of continuous expansion experienced by cities over time. The understanding of urbanization varies across different eras. According to researchers, urbanism is the science and art of rectifying past mistakes in urban planning through appropriate interventions by relevant authorities. The scope of this field of expertise includes all users and stakeholders involved in the urban environment. The practical implementation of these principles involves not only construction, growth, and activity but also addressing issues that hinder urbanization, such as destruction and decay. Hussein al-Sa'at further highlights that urbanization can encompass both positive and negative aspects.[(61)]

Urbanization refers to the utilization and development of various civil functions within a specific area. It can be classified into two types. The first type is organized urban expansion, which is regulated by public authorities according to specific urban standards. This type of urbanization follows a planned and structured approach. The second type is chaotic and spontaneous urban expansion, primarily driven by internal migration to the city. ([62]) It is the spread of urban forms that are linked with the pre-existing communities and there must be continuity of expansion. and organization.([63])

It is a general, multi-faceted concept that refers to the expansion of a city and its suburbs at the expense of the surrounding areas. This phenomenon leads to the development of rural areas adjacent to large cities gradually and increases their population density and helps to raise the level of services in them .[(64)] As defined by Herbert and Kutman, urbanization involves the spread of the urban structure beyond the established boundaries of a city. This extension of urbanization is often referred to as urban expansion, which signifies the expansion of cities beyond their original limits. Herper and Gottman defined urban expansion as the process of spreading and extending

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[60] Mutaib Manaf Jassem, (Principles of Urban Sociology), Asaad Press, Baghdad, 1976, p. 34.

[61] Rizki Jamoui, Mechanisms for Integrating the Environmental Dimension into Urban Improvement in Residential Neighborhoods Tebessa - Fatima Al-Zahra neighborhood, graduation note to obtain a Master's degree in Architectural Engineering, specialization: Architectural and Perimeter Engineering, University of Larbi Tebessi - Tebessa, 2015-2016, p. 11

[62] Hassan Al-Saati, Industrial Sociology, 3rd Edition, Beirut, 1980, p. 285

[63] Abdelaziz Mahmoud Kunduz, Urban Expansion of the City of Djelfa, memorandum for obtaining a master's degree in urban sociology, Faculty of Social Sciences and Humanities, University of Algiers, 2008-2009, p. 24.

[64] E.zer.Haward-Les cites Gardains De Demain –Dunod 1976-page 21

beyond the established boundaries of a city, indicating the expansion of the urban structure. Dr. Abdul Razzaq Abbas Hussein further expanded on this definition, explaining that urban expansion encompasses both the population's inclination to settle in cities and the physical growth of those cities, particularly larger cities. This expansion can occur in a random, unorganized manner or through scientific and planned approaches.[65] [66]

3.1.1. Urban Growth Models

Urban growth models are used to simulate and predict the expansion of cities and urban areas over time. These models are important tools for urban planners, policymakers, and researchers to understand the dynamics of urbanization, assess the impact of different scenarios, and make informed decisions about land use, infrastructure development, and resource allocation. There are several types of urban growth models, including:

Cellular Automata Models: Cellular automata models divide an area into cells and apply a set of rules to each cell to determine its future land use or land cover. These models simulate urban growth by specifying factors like population growth, economic development, transportation networks, and land suitability.

Agent-Based Models: Agent-based models simulate individual agents, such as households or businesses, and their decision-making processes regarding location and land use. Agents interact with each other and their environment, leading to emergent patterns of urban growth.

Geographic Information System (GIS)-Based Models: GIS-based models use spatial data and geographic information systems to analyze and visualize urban growth patterns. They often incorporate data on land use, land cover, population, transportation networks, and environmental factors to project future growth scenarios.

Statistical and Regression Models: Statistical models use historical data and regression analysis to identify trends and factors influencing urban growth. These

[65] Mr. Hanafi Awad, Residents of the City between Time and Place, Scientific Bureau, Alexandria, 1997, p. 195
[66] Harper and Gottman ((The Human Geography)) john willey and sons press-New york,U.S.A, 1967, p.23

models can be used for forecasting urban expansion based on past patterns and variables such as population growth, income, and accessibility.

Markov Chain Models: Markov chain models use a probabilistic approach to assess the likelihood of transitioning from one land use or land cover category to another over time. These models are useful for predicting land use changes and urban growth in discrete time steps.

Urban Simulation Models: Comprehensive urban simulation models aim to simulate the entire urban system, including land use, transportation, and socioeconomic factors. They provide a holistic view of urban growth and its impact on various aspects of city life.

Land Suitability and Constraint Models: These models assess the suitability of land for urban development based on factors like topography, soil quality, flood risk, and environmental regulations. They help identify suitable areas for growth while preserving sensitive or protected lands.

Dynamic Urban Growth Models: Dynamic models incorporate feedback loops and interactions between different urban subsystems. They can account for changing policies, economic conditions, and environmental factors that affect urban growth over time.

Urban growth models can be valuable tools for long-term urban planning and sustainable development. By simulating different scenarios and considering the environmental, social, and economic consequences of urban expansion, these models assist in making informed decisions to manage and guide urban growth effectively.

3.1.2. Urban Planning and Urban Density

Urban planning is a multidisciplinary field that involves a collective group of knowledgeable professionals to survey an urban area with problems to solve. Planning is an approach and method in politics, management, and every human activity. It is work with social, economic, and natural aspects, looking at things in their three temporal dimensions: past, present, and future, and setting out a set of intended consistent goals, achieving them according to specific priorities and within a specific period, to turn these goals into reality.

Urban planning involves the process of transforming the existing conditions of a group of people residing in a city or urban area from their current state to a more desirable situation in alignment with specific goals and objectives. This process includes analyzing the available resources and the surrounding conditions, as well as formulating strategies for the future.(67) It encompasses all the interventions and actions taken in the socio-physical environment to ensure the organization, functionality, and development of cities. These interventions may include rehabilitation, renewal, restructuring, and urban expansion. The concept of planning holds significant importance as it organizes the necessary actions for urban policies aimed at preserving the city as a cohesive living entity where old and new elements coexist harmoniously. It involves a continuous process that elevates the city to acceptable quality standards. Urban development relies on programming and planning as fundamental elements, with the objective of guiding and controlling urban expansion. It involves a collective effort to distribute and organize housing, activities, buildings, infrastructure, and transportation systems throughout the urban area.

The densification process involves utilizing vacant spaces within the urban fabric to increase the capacity of the city. This is achieved by constructing additional floors and expanding the built structures, ultimately aiming to create a city with a reasonable level of density.(68

3.1.3. Urban Fabric

The term "Urban Fabric" refers to the interconnected elements and physical components of a city, including its layout, networks, buildings, open spaces, and their spatial relationships. It encompasses the overall structure, dimensions, form, and quality of the built environment, as well as the patterns of connectivity and interaction between different urban elements. The concept of urban fabric is closely associated with urban morphology, which involves analyzing the spatial structures and patterns within a city . (69) Urban fabric is a system comprising physical elements such as road networks, built

[67] Harper and Gottman ((The Human Geography)) john willey and sons press-New york,U.S.A, 1967, p.23

[68] Ministry of Municipality and Urban Planning, Dictionary of Planning Terms, 1st Edition, Qatar, 2013, p. 12

[69] Abdel-Fateh Heba, In the Geography of Urbanism, Dar Al-Nahda Al-Arabiya for Publishing and Distribution, Beirut, 1980, p.139

structures, and open spaces. It encompasses the arrangement and interaction of these elements, as well as their location within the urban environment. Urban space is characterized by continuous transformations over time, as the constituent elements undergo evolution and change. ([70])

3.1.4. Desert Urbanization

The desert dwellers have inhabited the region since ancient times, and due to the challenging conditions, they have developed a unique and distinctive style of cities. These cities are characterized by their traditional architecture, which focuses on the construction of palaces and comfortable dwellings. This characteristic sets them apart from cities in other regions, particularly those located in the northern part of the Algerian desert.([71] In the context of palaces or traditional dwellings in the desert, one can observe that the urban fabric is constructed as a cohesive and unified structure. Its components are interconnected through a network of corridors that resemble arteries, serving as pathways between different parts of the settlement. These corridors often traverse palm oases, adding to the unique charm and natural beauty of the desert cities([72]) .

The oasis plays a vital role in the desert cities, particularly in the context of the urban fabric. It consists of lush palm forests that are often situated adjacent to or surrounding urban settlements. These palm trees serve as a valuable resource, providing a bountiful food source for the inhabitants. Additionally, the oasis contributes to creating a refreshing climate and a pleasant atmosphere within the city, offering shade and a cool breeze. Furthermore, the presence of the palm forests acts as a natural barrier, breaking the wind and preventing sand from encroaching into the palace or other structures within the urban fabric. .([73]) The term "urban landscape" refers to the complex set of attributes that characterize a city or a place, distinguishing it in terms of its relationship to its location and history. The urban landscape contributes to defining the identity of the city and allows for addressing the issue of urban quality and its advantages.

[70] J. Friedman (The urban translation) Edward Arnold, press, London, U.K,1975, p.6
[71] MAOUIA SAADOUNI –ELEMENTD'INTRODUCTION AL' URBAMISME-KASBAH-31
[72] Al-Zoukh and his colleagues, merging the antique fabric into the urban fabric, a graduation thesis to obtain a state engineer's certificate in urban management, 1999, p. 11
[73] Shawky and his colleagues, Urban expansion in desert areas, graduation note to obtain a state engineer's certificate in managing cities, class of 2000, p. 16

3.1.5. Dimensions of Urban Landscape

The physical dimension of urban landscape depends on the place, environment, and surroundings. On the other hand, the urban cultural dimension includes society, activities, and behaviors. ([74]) Built environment includes elements such as streets and buildings, and do not include the elements of the natural environment. An urban block refers to the total area occupied by various activities within a city. This area can encompass vacant or cultivated lands, as well as water bodies. It includes the approved divisions within the block. ([75])

Lampard indicates that there are three common elements of urbanization: the behavioral, the structural (functional),t and the demographic concepts ([76]). The behavioral element is concerned with the experience of individuals with certain behavioral patterns, while the structural (functional) element refers to the activities of the population, especially considering the changes witnessed by the economic structure from hunting to agriculture and then to industry, trade and transportation. The demographic element of urbanization refers to the concentration of population in urban areas. It signifies an increase in the number of urban centers and a growth in the population residing in those centers.([77]) Sociologists have defined urbanization as the process of moving from rural to urban areas, and this transition may be due to migration, and in this case the person or the group adapts according to the prevailing systems and values in the city.

According to J. Friedman, urbanization refers to the concentration of people who previously worked in agriculture and have now settled in small settlements where services, trade, and industry are the main activities. Urbanization also involves the development of production patterns and urban living within these settlements, which may then extend to other areas. On the other hand, Anderson suggests that urbanization can occur without individuals physically moving to the city or transitioning from

[74] Bu Marzouk Abdel Wahhab, previously mentioned reference, p. 341-342 -37
[75] Ministry of Municipality and Urban Planning, previous reference, p. 10-38
[76] Kayed Othman Abu Sabha, (Geography of Cities), Wael Publishing House, Amman, Jordan, 2003, pp. 56-57.
[77] Younis Hammadi Ali, (Principles of Demography), Baghdad University Press, 1985, p. 241 -40.

agricultural work. This is because there is continuous interaction and connection between rural and urban areas.([78])

3.1.6. Urban Space

The urban space consists of occupied or buildable lands that are designated for various purposes such as residential, administrative, and industrial activities. These lands are utilized based on specific and diverse consumption patterns. This involves the allocation of land for constructing buildings and the organization of their structures and spatial arrangements within the urban environment. ([79])

3.1.7. Urban Expansion

Dr. Abdul Razzaq Abbas Hussein defines the term "urban expansion" as encompassing two aspects: the population's inclination to settle in cities and the increase in the size of cities, particularly large ones. This process can occur randomly, without organization, or in a scientific and planned manner. According to "Harber and Cotman," urbanization involves the expansion and spread of the urban structure beyond the designated boundaries of a city. In other words, urban expansion extends beyond the specific areas where the process takes place. Rural areas are characterized by sparsely populated settlements that are located outside major cities or towns. They encompass landscapes and land uses that are primarily focused on agricultural activities and the utilization of natural resources. Non-urban development aims to enhance the quality of life for rural residents by focusing on the development of various aspects, including social, economic, environmental, cultural, and human resources. Non-urban area is an area that includes a wide variety of non-urban land and includes agricultural, livestock and other primary products trade activities **(80)**

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[78] Boumerzouk Abdel Wahab, The International Forum for the Oasis Field and Sustainable Development, year, 2000, p. 340

[79] Malik Al-Dulaimi and Muhammad Al-Obaidi, (Urban Planning and Humanitarian Problems), Ministry of Higher Education Press, University of Baghdad, 1990, pp. 225-226

[80] Ministry of Municipality and Urban Planning, previous reference, pg. 60ew york , u.s.a ,1967, p.23

3.1.8. Forms of Urban Expansion:

There are many views of urban planning specialists on the forms of urban expansion. Some of them affirmed two forms; the horizontal expansion that prevails in cities located in the plain areas and surrounded by open areas, where there are no natural or human determinants that limit this process, and the vertical expansion prevailing in modern cities with high population density ([81])where there are natural or human determinants that limit its horizontal expansion. ([82])

Random Expansion refers to the unregulated expansion of urban land uses without prior planning. It occurs based on the desires and preferences of individuals or entities, taking various forms depending on the factors that facilitate the establishment of these uses.

Cumulative Expansion: This is the most basic type of urban growth, characterized by filling vacant spaces within the existing city or constructing on its periphery. It typically occurs when land prices in the city center are high compared to the outskirts. The city expands in concentric rings, with new development occurring in successive circles. A notable example of this is the circular expansion of Greater Moscow ([83]).

Multinuclear expansion: It involves the emergence of a modern city in close proximity to an existing older city, followed by the merging of these cities to form a larger metropolitan area.

Gradual expansion: It refers to expansion in the form of scattered leaps, with the purpose of creating urban complexes that are not directly connected to the central city. These complexes are separated from the central city by empty areas. ([84])

Linear or networked expansion: This aspect of urban expansion takes the form of strips extending from the city center towards the outside with the extension of transportation routes.

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[81] Pierre marlin etr francois choay : dictionnaira del'orbanisme et de l' aminagement p.68044
[82] Atiyat Abdel Qader Hamdi, (Geography of Urbanism), Dar Al Maaref Press, Alexandria, 964, p. 101.
[83] Salah Hamid Al-Janabi, (Urban Geography, Foundations and Applications), Press of the Ministry of Higher Education and Scientific Research, University of Mosul, 1987, pp. 343-347.
[84] Abdel-Fattah Muhammad Wahiba, (On the Geography of Urbanism), Dar Al-Nahda Al-Arabiya, Beirut 1980, p. 147.

Axial expansion: This type of expansion also involves the extension of transportation and communication lines, which may result in wide spaces between these extensions. This expansion can take on a linear shape. On the other hand, network expansion resembles a star shape, with transportation and communication lines radiating outwards.([85])

Planned Expansion: This form of expansion takes place through direct or indirect state intervention in directing, organizing and equipping urban expansion.

3.1.9. Urban Sprawl

Urban extensions occur when a city expands into the surrounding rural areas, resulting in a mix of urban and rural land uses at the urban edge. As the city grows, the countryside adjacent to the newly developed areas tends to decline, while the city center retreats as one moves away from it and enters the surrounding rural areas. This pattern of urban expansion is often referred to as urban sprawl. ([86])

Suburbs: A suburb refers to an urban area that is located either within or outside the municipal boundaries of a city, typically at a convenient distance from the central city. Suburbs are closely connected to the central city through strong economic, social, and cultural ties. They are connected by roads and are characterized by non-agricultural areas or fields where various economic activities take place. Some researchers refer to suburbs as a combination of recreational and functional areas. The emergence of suburbs in Iraqi cities was a result of land acquisition and the establishment of housing cooperative societies, which primarily developed on the outskirts of built-up areas. Today, there are various types of suburbs, with residential and industrial suburbs being the most common. The industrial suburbs around Baghdad serve as a successful model for locating industries away from the city center while ensuring their efficient operation. Examples of these suburbs include Nahrawan Al-Taji and Al-Ma'amal area located along the old Baghdad-Khan Bani Saad Road.

[85] Salah Hamid al-Janabi, a previous source, pp. 343-347.
[86] Peter. Hall ((The world cities)) london.1968 pp.175-177

3.1.10. Urban Satellites

A satellite town refers to a group of urban settlements or centers that surround a major urban center or city. These satellite towns are typically located on the outskirts or peripheral areas of the main city. They are designed to provide residential, commercial, and recreational facilities for residents who prefer to live outside the crowded central city. The concept of satellite towns was popularized by examples such as the garden cities surrounding London and the suburban cities surrounding Paris and New York (87). As for Iraq, the cities of Al-Zubayr, Al-Faw, Abu Al-Khasib and Al-Qurnah are considered urban satellites that spread around the great city of Basra (88)

Characteristics of Satellite Cities: Despite being independent from the central city in many services, satellite towns have a great need for the central city. This is because there are certain services and resources that the central city may not be able to provide to their residents due to economic and spatial limitations.

Satellite cities are typically located at a considerable distance from the central city. However, in certain cases, some satellite cities can become so close to the central city that they almost appear to be attached to it.

Satellite cities are larger in size compared to residential and industrial suburbs. They offer a wider range of urban and service activities, catering to the needs of their residents.

There are industrial satellite cities, most of whose residents work in industrial activity, while fulfilling their needs of services in the central city.

Some satellite cities have recreational centres where the residents coming from the central city spend their time in rest and recreation (89)

3.1.11. Urban Development

The examination of the spatial growth stages of different urban centers, including urban expansion, urban extensions in the form of suburbs, and the emergence of urban satellites or interfaces, has been a topic of interest for researchers and development

[87] Salah Hamid Al-Janabi, Urban Geography, previous source, p. 385
[88] Adel Abdullah Khattab, (Geography of Cities), Baghdad University Press, 1990, p. 182.
[89] Hugn.D.Chout (Rural geography, An introductory survey) pergamon press, oxford.1972 p38.

specialists. A- Among these specialists are Berroux, Boudeville, Hirschman, and Myrdal, who have focused on the application of the theory of growth poles in achieving urban development and regional spatial development. These specialists have emphasized the potential of growth poles in driving economic and spatial development, particularly in developed countries. They argue that the presence of numerous major cities in these countries serves as models and catalysts for achieving urban and spatial development. Their ideas and perspectives revolve around utilizing growth poles as strategic centers that stimulate economic activities and attract investments, leading to overall regional development.([90])

B- J. Friedman's views highlight the potential application of the theory of growth poles in achieving comprehensive urban and spatial development, particularly in developing countries. He emphasizes that even in countries that lack a multitude of large cities at different stages of development, the concept of growth poles can still be effectiveThe first stage is marked by the dominance of a single growth pole due to various favorable factors, such as abundant natural resources, a dense population that creates a significant consumer market, and a favorable location. During this stage, the process of polarization is stronger than the forces of dispersal and proliferation, leading to the concentration of development and positive effects around the dominant pole.

In the second stage, there is a gradual transformation in the structural composition of the urban center and the surrounding region, resulting in the emergence of a multi-nucleated structure. Each nucleus represents a desirable state of development. However, despite the presence of multiple centers, the effects of polarization continue to outweigh the forces of dispersal and diffusion. The dominant pole maintains its influence and attracts resources and investments, exerting a stronger impact on development compared to the spread of development to other areas. The third stage is characterized by the increasing influence and spread of development throughout the region. Clear effects can be observed in the formation of new urban nuclei and satellite cities around the central pole. However, the polarizing influences still retain their strength and continue to have a more significant impact compared to the spreading forces. The growth and development in the region are influenced by the dominant pole, while other centers and satellites experience varying levels of development and

[90] Hugn.D.Chout (Rural geography, An introductory survey) pergamon, op,cit,.p40

connectivity. ([91]) The fourth stage represents the final phase in the functional development of the region. It is characterized by the integration of non-urban areas that exist between urban centers into the economic fabric of the central areas. This stage represents an ideal scenario where a balance is achieved between the effects of polarization and spreading. **([92])**

3.1.12. Issues related to Urban Growth

Land Use Problems: The land use is related to the changes and transformations defined by the population needs, as the migration of the population to the city leads to an increase in the demand for housing, equipment and work, and this produces a more spacious urban area, which leads to the consumption of the area to meet this need. **93)**

Transportation Issues: This disruption of the ecological system in the areas surrounding cities poses risks such as desertification and the encroachment of urbanization. The construction of transportation routes, roads, and the establishment of factories and facilities on agricultural lands contribute to this phenomenon. These activities result in the loss of valuable agricultural resources, habitat destruction, and the degradation of natural ecosystems. Consequently, the delicate balance of the surrounding areas is disturbed, potentially leading to long-term negative environmental consequences. **(94) .**

Lack of Planning: Urban agglomerations and their growth often follow a pattern of random horizontal expansion, which poses a significant danger. This expansion frequently occurs at the expense of fertile lands, leading to the loss of agricultural resources. According to United Nations reports in 1990, the size of urban areas in developing countries was projected to double from 8 million to over 17 million by the

[91] Medhat Muhammad Al-Akkad, (Introduction to Development and Planning), Dar Al-Nahda Al-Arabiya Publishing, Beirut, 1980, p. 135

[92] Falah Jamal Marouf Al-Azzawi, (Polars of growth and spatial development in developing countries - an evaluation study in its practical capabilities), Journal of the Iraqi Geographical Society, No. 22, 1988, pp. 59-63

[93] Hamada Rafik, Urban Consumption and Sustainable Development, (A Field Study, Borges Bourej), Master's Note, Urban Techniques Management, City Management Specialization, City Management Institute, Boussaf M'sila University, 2015, p.6

[94] Sameh and Farhan, Ghariba and Yahya, 2003 AD, Introduction to Environmental Sciences, Dar Al-Shorouk for Publishing and Distribution, Amman, first edition, 2001, pg. 99

end of the century. The loss of agricultural land not only contributes to the degradation of the ecosystem but also creates numerous challenges for cities, including ensuring a stable food supply for urban areas. Urban areas often rely on nearby farms for food production, and the loss of agricultural land can disrupt this crucial supply chain, further exacerbating urban challenges. **(95)** .

Economic Issues: There are several reasons that contribute to the desire of residents in large cities to live in the suburbs outside the city limits. One behavioral reason is the preference for a suburban lifestyle, which offers a quieter and more spacious living environment compared to the bustling city center. Additionally, economic factors play a role, such as the high prices of agricultural land surrounding the city. This encourages landowners to sell their land for residential or industrial development purposes. As a result, we observe the expansion of residential areas encroaching upon fields and farms. **(96)** The people of the area left the work in agriculture, which leads to the neglect of agricultural land, and the use of it for construction instead of farming **(97)**.

Population Growth: Population movement, whether through migration or natural population growth, plays a significant role in the expansion and distribution of populations across different geographic areas. This movement is driven by various factors, including the search for abundant resources, the need to meet the growing population's requirements, and the disparities in the distribution of natural resources. As the population increases, there is a need to provide sufficient food, housing, and services, leading to the exploration of new areas and the development of larger territories to accommodate the expanding population. The movement of populations is influenced by both internal and external factors. Internally, population movement occurs within a country or region, where individuals may migrate from areas with scarce resources or face population expulsion to areas that offer better opportunities or attract population

[95] Ahmed: Al-Sayyid Al-Bushra Muhammad, 2006 AD, Studies in Urban Geography, first edition, Khartoum - Sudan, Azza Publishing House, p. 123
[96] Ahmed: Al-Sayyid Al-Bushra Muhammad, 2006 AD, Studies in Urban Geography, first edition, Khartoum - Sudan, Azza Publishing House, p. 123
[97] Al-Saqar: Fouad Mohamed, 1996, Regional Planning, Alexandria, Mansha'at Al-Maaref, 34

growth. Externally, migration involves people moving across borders, either voluntarily or due to forced displacement **(98).**

3.2. The Efficiency of Community Services

Assessing the efficiency of community services is a complex task that often requires careful evaluation, data analysis, and ongoing monitoring. Efficiency goals should align with the specific objectives and values of the community being served. Regular reviews and adjustments may be necessary to optimize the delivery of services over time.

3.2.1. Performance Systems and Evaluation of Community Institutions

The term 'performance' refers to an individual's work activity or their ability to fulfill the requirements of their job within an educational institution. It encompasses both quantitative information, which includes the notions of sufficiency and efficiency. Sufficiency pertains to the outcomes that an individual can attain or strive to achieve using the available resources within their institution. Efficiency, on the other hand, relates to the ability to achieve the desired results and the extent of the individual's capability to do so. Performance can be categorized into two types: (99)

1- Total performance.

2- Partial performance.

The total performance is determined by the performance of the entire community service institution, whether it is health, educational, recreational, or religious. As for partial performance, it means the performance of the sub-institutions affiliated to the total performance institutions, i.e. schools, health centers, the directorate of horticulture and gardens, or places of worship, and the performance of these must be approved. "Institutions are influenced by both internal and external factors. Internally, technology plays a crucial role as one of the key factors that must keep pace with societal

98 Muhammad, Abd al-Rahman al-Sharnoubi, 2005 CE, Population, Anglo-Egyptian Library, Cairo, p. 87
99 Samir Salhawi, Occupational Accidents and Their Impact on the Institution's Competitiveness, Unpublished Master's Thesis, University of Batna, Algeria, 2007-2008. Pg. 67

advancements. It determines the type of services provided and the level of consistency in performance. Additionally, internal factors include the human elements, such as gender, age, educational level, qualifications, and the presence of incentives, if applicable, which significantly impact institutional operations. **(100)**, Externally, institutions are influenced by social, cultural, political, and economic factors. These external factors, including technology, are often beyond human control or may be inaccessible. However, they are important facilitators for effective implementation.

3.2.2. Visual Performance of the Community Institution

The performance of an institution is determined by the individuals who directly interact with the recipients of the service. It is the direct performance of the employees providing the service that allows for evaluating the institution's performance and assessing the quality-of-service delivery. The effectiveness of their performance relies on their diverse skills and competencies.

- The interior design of the institution depends on the following:
- The location of the institution **(101)**
- Necessary equipment and supplies that assist in the performance of the service.
- The beneficiary of the service: It is known by several names: the final consumer, the buyer or the customer, the beneficiary, and it is divided into two types:
- The internal beneficiary.
- The external beneficiary.

The internal beneficiary works in the functional departments of the service institution, ie the person who performs the service delivery process, or in other words the service provider. On the other hand, the external beneficiary is the one who deals

[100] Maneh Sabrina, Work stress and its effects on the performance of university professors, an unpublished master's thesis, Batna University, Algeria, 2007-2008. p. 67.
[101] Falah Shaker Aswad, Objective Maps, Mosul University, Dar al-Kutub, 1991. pp. 285-287.

with the service provided by the institution, ie the recipient of the service in its final form.

3.2.3. Senior Management of the Service Institution

It is represented in the institutions that plan or decide on the subsidiary institutions, including Education and Health Ministry, Municipality Directorate and Governorates. The performance in educational institutions is determined by the following:

- Teaching performance.
- Administrative performance. There are three forms of knowledge available to the individual in the community institution:
- The knowledge that an individual acquires from society or the sciences he has studied.
- The practical knowledge that he acquires of the number of years of service he works in the institution and how to deal with it.
- Private knowledge (family knowledge).

The variation in these forms becomes apparent due to differences in the environment and the societal values inherited, as well as the knowledge individuals acquire and develop through their engagement with various fields of study. The ability of individuals can be measured through their professional practice and the knowledge they possess, which may vary among individuals. Some individuals have practical knowledge that they can effectively apply, while others may still be in the process of acquiring knowledge. Some individuals have acquired practical knowledge and demonstrate competent execution, while others may require guidance and further development to achieve proficiency in their professional practice. It is challenging to assess individuals' abilities accurately, but evaluating their successes in practical

application and their progression within their professional roles can provide insight into their capabilities and specialization **(102)**

The ability to execute functional performance is influenced by the individual's environment and their motivation to deliver the service at the required level. It is also influenced by their educational background, including their academic qualifications and the experiences they have gained throughout their learning journey, whether positive or negative.

An individual's ability is acquired through engaging in activities and utilizing appropriate means of performance. It is not innate and can diminish if not given the opportunity to manifest. Over time, a community institution may decline if it lacks the necessary opportunities for individuals to develop their abilities. The individual possesses practical skills that are honed through performing their tasks within the institution, coupled with individual knowledge that enables them to carry out their assigned responsibilities and other required activities effectively. Capacity or efficiency is considered one of the qualifying factors for attaining job positions, which are often determined by progression within different departments (such as managers, department heads, associates) or by holding a relevant academic degree. The individual bears the responsibility of their position and must exert administrative effort to demonstrate their competence. It is also the responsibility of the institution to evaluate the performance of its employees**103)**.

The distinction between the actual service provided and the expected service becomes evident through the differing perspectives of the service recipient and the provider. These viewpoints may diverge, with one aligned directly with the intended path and the other deviating from it. When the recipient's expectations are met, their

[102] Youssef Nabrai, Ali Muhammad Yahya, the relationship between educational ability and some personality traits among school principals and agents, Journal of the Emirates College of Education, Issue 2, 1988. pp. 27-28.
[103] Aqil Jassim Abdullah, Microeconomic Analysis, second edition, Amman, Dar Majdalawi, 1999. pp. 39-106.

perception of the service is positive, and vice versa. [104]. Service evaluation [105] is determined by the following.

- Interior design of the service institution
- Attention in the first place to the recipients of the service.
- Using modern means (technically).
- Avoiding or correcting errors.
- The appearance and general characteristics of service providers.

What comes to the recipients of the service can be seen:

- Personal needs.
- Previous experiences, both positive and negative.
- The expected service.

The method of service delivery can take various forms, including:

- The slow form: This refers to a service that is not desired in its final outcome due to its slow pace or inefficiency.
- The quick form: Although not necessarily quick, this type of service is desired by the recipient due to the high quality of performance or the satisfactory end result it provides. [106]

3.2.4. Influencers in the service of education

The influences on education vary according to the state and the policy that it follows, and it takes many forms, including internal and external influences.

Internal Influences: The divisions of each influencer differ from the other, and the difference appears in the administrative connection, i.e. the boss and the subordinate,

[104] Feryal Wassef Muhammad al-Haj Muhammad, evaluation and planning of educational services in the city of Tubas using geographic information systems, unpublished master's thesis, An-Najah National University, College of Graduate Studies (Geographical Program), Palestine, 2010. pp. 50-55

[105] Luha Ragad Saliha, Evaluating Service Quality from the Customer's Perspective, an unpublished Master's Thesis, Hadj Khidr University, Algeria, 2007-2008. p. 26.

[106] Ahmed Al-Khatib, University Education in the Arab World (Challenges and Future Alternatives), Journal of the College of Education and Arts, Yarmouk University, Jordan, No. 7. 2003. pp. 207-214.

and the communication that appears in the form of a hierarchical model. The internal branch is divided into the following influential elements:

- Funding: It is divided into (centralized financing and non-central financing).
- Management: The type of management, whether it is good or not, is affected by the following elements, flexibility, computer training, ability to plan and find solutions, achieve justice and non-discrimination among employees, spirit of continuous follow-up.
- Study subjects: It is subdivided into (type of subjects (traditional, non-traditional), method of admission, the possibility of the student and its compatibility with the study subjects (appropriateness)
- Teacher: It varies according to the elements (certificate, method of preparation, type of study system, tests that he was subjected to during his training period **(107)**
- The building: It is divided into (valid, invalid).

External influences: There are many external influences with different levels or specific circumstances, including:

- Cultural level: It is affected by (language, type of society, its acceptance of development or change).
- Economic level: It is divided into (quality in education, return on education, individual's standard of living). **(108)**
- Social level: Defined by (poverty, unemployment, crime).
- The political level: Determined by (the goals of global control, the extent to which security is achieved, political stability

Among the influential elements in education, financing plays a significant role as it determines the existence and efficiency of the educational service. In Iraq, the ministries of Education and Higher Education separately adopt a central financing

[107] Ahmed Al-Khatib, University Education in the Arab World (Challenges and Future Alternatives), Journal of the College of Education and Arts, Yarmouk University, Jordan, No. 7. 2003. pp. 207-214.
[108] Ayman Fraihat and Hisham Al-Samadi, The Economics of Education in Jordan in the Light of Globalization, Journal of Human Sciences, Issue 40, 2009. pp. 10-11.

approach for the education sector. The method of financing varies across institutions based on the expected outcomes. It is important to note that there is a relationship between financing and the quality of education, which is influenced by external factors. **(109)**

3.2.5. Spatial Patterns

Patterns encompass various concepts, including those created by groups of people united by common bonds. These patterns can be observed in population dynamics, urbanization, social institutions, and organizations. They are also evident in the design and construction of housing units, which reflect the interests, backgrounds, and future directions of groups of students or residents. **(110)**. Additionally, patterns help determine the timeframe and location for providing services, aiding in the development of scientific and social treatments. Understanding the spatial distribution of these patterns is crucial for later analysis. An individual functions as a node within a network of social activities, influencing and being influenced by internal and external social relations. The economic and social levels of individuals differ, indicating variations in well-being and standard of living, which are often tied to family standards. **(111)**

Similarities in these aspects among individuals can be considered patterns, highlighting their distinctive characteristics and behaviors. Services are received by individuals in specific areas, not necessarily limited to residential zones, and the variance in accessibility reflects differences between patterns and distribution. Patterns are more stable compared to distribution, as they are influenced by multiple factors that vary over time and place. **(112)**

The distribution of patterns involves various processes that can influence the presence of certain categories in specific areas. This indicates that different reasons and interactions with the surrounding environment shape the activities of individuals.

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[109] Ayman Muhammad Freihat, Hisham Al-Sahawi, previous source, p. 18.

[110] Ahmed Abdel Karim, the problem of population growth and its impact on the development of education in developing countries, Alam Al-Fikr magazine, No. IV, Kuwait, 1979, pp. 65-90

[111] Ali Al-Salami, The Administrative Approach to Treating the Population Problem in Developing Countries, Al-Fikr Magazine, Issue 4, Ministry of Information, Kuwait, 1979, p. 103

[112] Numan Shehaza, Quantitative Methods in Geography using Computer, 2nd Edition, Dar Safaa, Amman, 2002. p. 32.

Furthermore, an individual's social and economic levels, as determined by their standard of living, differentiate them from others and contribute to their identification as part of a pattern when similarities exist in the standards or characteristics that define a group **(113)**

3.2.6. Demographic Data

These data highlight the distribution of individuals, the method of distribution, knowledge of what is related to individuals, and identifying the levels of welfare, social or class that determine the social behavior of the individual. The increase or decrease in population, also known as demographic change, has a significant impact on various factors, including the expansion of neighborhoods and the need to adjust their size. This change is driven by shifts in family sizes, the continuous desire for independence, and variations in age structures. Moreover, population density and its annual fluctuations are closely linked to the demand for different community services. **(114)**

3.2.7. Influences on the performance of community services

Incentives can be a confusing matter in the service sector because the term "incentive" is used in different ways across various services, leading to different meanings, uses, and synonyms **(115)**. However, one thing remains true: individuals must pay for obtaining the service, and pricing, like other elements, should align with the objectives, policies, and programs of the service institution. The principles and methods of pricing in commercial products, which differ from services, may vary in their impact depending on the type of service and its circumstances. Traditional considerations such as competition, costs, and demand also influence pricing. Services, unlike products, are not storable, making it challenging to meet fluctuating demand solely through service provision. This can cause first-time users to find it difficult to understand the value they

[113] Maher Yaqoub Musa, Geographical Analysis of the Residential Job in Basra (1977-1996), University of Baghdad, unpublished doctoral thesis 1997, p. 9.
[114] Mudar Khalil Al-Omar, Muhammad Ahmad Aqla Al-Momeni, The Geography of Problems, Dar Al-Kindi, Jordan, 2000, p. 13-20.
[115] Tahseen Jassem Shanan Al-Azrajawi, Residential Patterns in Nasiriyah City, unpublished Master's Thesis, College of Education - University of Mosul, 2004. pp. 24-35

receive for the money they pay. However, the presence of material content in a service increases the likelihood of identifying incentives based on cost and developing standardized procedures. Conversely, services with less material content rely more on the service provider's acceptance of the incentive, making it less feasible to establish standardized procedures. This does not mean that standardized procedures are unnecessary for services with lower material content; **(116)**

The service provided may be easier to diversify, and therefore it depends on:

- The level of service.
- Quality of service.
- The volume of service that can be modified according to individual requests.
- Price as an indicator of quality.
- The fame of the individual (doctor or teacher).
- The institution that provides the service.

On the other hand, professional unions may not support wage cuts for each service, especially in the case of scarce services. Professions such as doctors and private teachers have more freedom in setting prices, which leads to a greater diversification of prices based on an individual's ability to pay. In these cases, price can serve as an indicator of the quality and reputation of both the individual provider and the institution offering the service. It is important to note that there is often no separation between the service itself and the provider of the service. This lack of separation may be due to geographical or time limitations that restrict the areas that can be served. **(117)**.

On the other hand, individuals may seek services in a specific geographical area or at a particular time, and this factor can influence the prices set by service institutions. Pricing is considered an important tool for these institutions to achieve their goals, and it is closely linked to the balance of supply and demand within the service sector. However, not every service provider has the freedom to set prices arbitrarily, especially

[116] Khalifa Ali Al-Suwaidi, Educational Curricula and Creativity, Journal of the College of Education, UAE University, a special issue of the researches of the (Tomorrow's Education) conference, 1996. pp. 270-307.
[117] Hassan Mustafa and his colleagues, New directions in school administration, third edition, Anglo Library, Egypt, 1985. Pg. 312-411.

in cases such as outpatient services. The basis for pricing in such instances relies on several factors:

- Type of institution.
- Law and Legislation: Increasing or reducing prices in government institutions is often associated with it
- The extent of the service provider's ability to provide what is commensurate with the service provided.

The goals for specific types of services that are subject to government legislation differ, as they aim to achieve social and political objectives, ensure continuity, and maintain social status. These services are driven by non-profit goals rather than purely financial motives. In Iraq, certain services like education, health services, and public institutions are regulated by state legislation. Social and political goals play a significant role in determining the provision of these services, often overriding economic considerations. The state assumes the responsibility of covering the costs of public institutions, driven by social and political motives. For instance, compulsory education is provided by the state, and the fees for public health services are kept low to ensure access for those who cannot afford private healthcare. However, the state may also charge higher fees for certain public services to reduce excessive demand and encourage more efficient resource allocation. **(118).**

The pricing of certain public services, such as health insurance and services provided by the Capital Municipality, can be influenced by the individual's ability to pay. In some cases, the state may implement direct or indirect taxes on these services, taking into consideration political, social, and economic factors. Our service institutions are regulated by official self-instructions and operate within the framework of union or federal legislation to a certain extent. However, the specific regulations and their impact on the institution's level may vary from one country to another. The relationship between self-financing costs and quality can be observed in services such as healthcare. When a new service is introduced, the institution may initially charge lower fees due to limited

[118] Shiraz Muhammad Traboulsieh, Quality Management of Educational and Research Services in Higher Education Institutions, first edition, Dar Al-Aysar, Jordan, 2011: pp. 86-91.112-Hamid Abd al-Nabi al-Tai, Bashir al-Alaq, (Marketing of Services) Zahran Publishing and Distribution House, Amman, 2004. pp. 42-43

direct competition and high demand for the service. These fees are typically constrained by the nature of the service itself, aiming to avoid confusion and protect individuals. The proportion of nominal fees imposed is reduced to a lower level based on the responsiveness of demand to changes in nominal prices. In the case of healthcare services, demand is often flexible, influenced by the income elasticity of the individuals seeking the services. Generally, an increase in income leads to a greater demand for certain services, including healthcare and travel, among others. **(119).**

Some services are provided for the public benefit, and government authorities do not require prevention or isolation in return for providing them to beneficiaries. This situation occurs when it is impossible to prevent or isolate certain individuals or groups from benefiting from the service, such as education in government schools or services in hospitals. The wages paid by lawyers, doctors and similar professions are monitored by professional syndicates and professional ethics is the main reason for restricting and determining the pricing of professional services, because the demand for services such as medical services and health care is flexible. Professionals have a moral responsibility not to charge individuals high prices.

On the other hand, there are arguments that suggest considerations beyond competition play a relatively minor role compared to the preferences of professional institutions, such as the Doctors Syndicate, in determining wages. From the professionals' perspective, they believe that their compensation should not be directly tied to the amount of time they spend on a particular service. Instead, they feel that their remuneration should be based on the value they bring through their activity or the outcomes they achieve. **(120).**

Some individuals who receive the service show a psychological and emotional impact. The recipient relies on the reputation of the service provider and other factors when evaluating alternatives. Wages are considered as a main indicator of the quality of service, like doctors who receive a higher wage than the rest. Before 2003, doctors in some healthcare systems received low wages, often referred to as symbolic prices. These wages were relatively low and served as a source of income for health institutions

[119] (Richard L, Arends), translated by Fayed Rashid Rabeh, Leadership Functions for Education, Dar Al-Kitab, Gaza, Palestine, 2005: pp. 14-53.
[120] Yaqoub Hussein Nashwan, Education in the Arab World, Amman, Dar Al-Furqan, 2005. pp. 2-19.

operating under a self-financing system. The fees directly collected from patients for healthcare services constituted a significant portion of the financial resources for these institutions.

The imposition of wages for health care is represented in the following points:

- Initial visit to the doctor
- Medicines
- Fees for hospitalization.

The wage system prevents the poor and the chronically ill from receiving proper care if they cannot afford the necessary expenses. Therefore, wages cannot be the only or even a major source of resources if one of the main goals of the public health care system is to provide health care for all. The difficulty lies in raising wages to the extent sufficient to provide important resources for the health sector and to prevent the regular beneficiary from misusing health care services., Additional wages can be imposed in exchange for providing additional services such as sleeping in a private room, Special meals are provided, and a TV is provided in the room. These additional wages have now been applied. In some cases, there may be provisions for reimbursement from private patients who choose to utilize public health services. However, this process can involve administrative complexities and vary depending on factors such as the duration of the stay and the number of accompanying individuals. (121).

The salary, or wage, received by individuals who provide services such as doctors, teachers, or service employees varies based on the specific ministry or sector they work in. The monthly salary is determined by the state budget and is specific to each service provider. The salary structure may include various wage elements that form the basis for determining the compensation:**(122)**

- The basic calculation (the nominal salary), which is measured by the number of years of service, i.e., the job rank.

[121] Mohsen Abdul-Saheb Al-Mudhaffar and Sabri Mustafa Al-Bayati, Spatial Analysis of the Distribution of Health Services in the City of Baghdad, Iraqi Geographical Society, No. 26, Baghdad Al-Ani, 1991. pp. 66-78.
[122] Amer Ibrahim Alwan and his colleagues, Teaching Competencies and Teaching Techniques "Concepts and Applications", Dar Al-Yazourdi, Amman, 2011: 307-325.

- Calculating the certificate for the service provider (Bachelor, Master, Diploma, Preparatory...)
- Allocations for the position (director, assistant, general manager, department head...)
- An allowance for the mode of transport according to the geographical area (rural, urban, remote area...)
- Matrimonial and child allowances.
- Tax.
- Pension stops.

community service information system **(123)**

1- Inputs in the religious service institution, the hierarchy of service performance is represented by the following agencies:

- Religious Endowments Authority
- Directorate of the Shiite and Sunni Endowment and other religions.
- The responsible administrator in the institution.
- The preacher.
- A community of citizens.

2- Institutional buildings: It is represented in the place where religious rites are performed from what we know, which is the mosque, the Husseiniya, the temple, the church, the sites affiliated to the endowment in which Friday prayers are performed **(124)**

3- Output:

- A good citizen.
- An ideal society or close to it.

[123] Al-Guibrawi, History of Medicine in Maysan, previous source. pp. 92-101
[124] Muhammad Medhat Jaber, Faten Muhammad Al-Banna, Studies in Medical Geography, 1st Edition, Dar Safaa, Amman, 1998. pp. 464-466.

- Continuous performance of religious rituals and communication with service performance.
- Quality preservation of the security of the region with the availability of this service.

Information system for educational service **(125)**

The hierarchy of community service is:

- The Ministry.
- The General Directorate of Education consists of;
    - General manager, administrative assistant, technical assistant
    - Heads of departments (self, planning, exams, accounts (primary, secondary, professional), technical affairs, sports affairs, legal affairs).
    - Supervision specialization (primary, secondary)
    - Employees of different qualifications.
    - service workers.
    - Schools consisting of;
        - Manager.
        - teacher. Pupil.
        - Parents.

Education is represented by a set of procedures of complexity and intertwining in its branches with special relationships characterized by goals that must be achieved. Like any known system, it has inputs, procedural processes and outputs that can be arranged as follows:

1- Input: In the context of the school system, there are various fundamental factors that determine the purpose of conducting or providing educational services. These factors are specific to the system and are governed by laws, legislation, and principles that guide its operations. The school system aims to achieve success in various

[125] Data of the General Directorate of Education in Maysan, salary data for the month of October 2010 AD, the Institute of Morning Teachers' Qualifications

ways and relies on collaboration between different stakeholders involved in the educational process: **(126)**

- The manager.
- The educational staff (teachers, teachers).
- The students.
- Employees of all kinds.
- School buildings

Represented by the institution that is managed in the educational process, it is necessary to note its suitability for education, scientific equipment and equipment, laboratories, libraries, playgrounds and furniture. It is important to know the time of its establishment and the time the student spends in school, in addition to the various services that are provided within the school buildings, including:

- The health service.
- Counseling.
- Recreational service and sports activities.

2- Operations (127): The interaction between inputs and outputs within the school system is complex and multifaceted. It reveals the presence of interconnected components that play a role in the transformation process.

These components rely on the available inputs, such as the personnel and activities involved. For instance, the school director is a key figure who oversees the operations and functions of the educational institution. They play a vital role in coordinating and managing the various inputs to ensure the smooth functioning of the school **(128)**, including:

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126 Khadija Abdul-Zahra Hussein, building an analytical model to simulate educational services for secondary schools in the city of Basra, College of Arts, University of Basra. pp. 1-29. Research published on the link: www.Pdffactory. Com

127 Sami bin Yassin Brahmin and his colleagues, Institutional geographic information systems as an effective tool in support and spatial decision-making, Saudi Arabia, working paper published on the link: com. www. Geographic Information system

128 Muhammad Abdullah Al-Baili, The Reality of Educational Research and Its Obstacles in the United Arab Emirates, Journal of the College of Education, United Arab Emirates University, Issue 9, 1993. pp. 121-148

- Planning.
- Organizing.
- Supervision and direction.
- Follow up.
- The calendar.

In the school system, various roles and responsibilities exist within the framework of individual personalities or shared among a group of individuals. These roles may differ depending on the specific educational system and the individuals entrusted with management. For example, the school manager may have a unique role in the planning and decision-making process. They may take on the responsibility of determining the overall direction and goals of the school. They may delegate other tasks and responsibilities to the teaching staff or other members of the administrative body based on their judgment and expertise.

Output: It is represented by the result of providing the service or working on it from the inputs to the final stage, and the time saved for it is specified at the beginning and end of the academic year and appears as follows:

Type of performance (good, not good)

- Job satisfaction.
- Take advantage of the outputs to enter them into another system.
- Preparing the student to be useful in society.

3- The system of the health service institution: the health service institution consists of:

- The Ministry.
- The General Directorate of Health in Maysa N. Branches from it- :
- hospitals.
- Primary health centers.
- Sub-health centers.

Input: Health inputs are as clear as other institutions in:

- the patient.
- Various scientific qualifications from a doctor, administrator, pharmacist...
- The health employee.
- Employees of another kind (worker, guard, security...)

4- Institutional buildings: It consists of many hospitals, primary and secondary health centers, the Directorate of the Presidency of Health, pharmacies, storage and analytical laboratories that are sometimes available inside the hospital **(129).**

Operations: Mathematical and health procedural processes play a crucial role in facilitating efficient and accurate treatment tasks, as well as maintaining comprehensive documentation for patients to reference their health condition. These processes have evolved from traditional methods to incorporate advancements in technology and development. The proper handling and organization of official papers in a sequential manner contribute to the comfort and satisfaction of the service recipient, whether it is qualitative or relative in nature. These papers are often digitized and stored in dedicated computer systems for efficient tracking and management of the patient's condition.

In particular, for cases that require ongoing monitoring or for contagious diseases, the use of specialized software programs, such as Geographic Information System (GIS), is employed. This technology allows for the identification and mapping of specific locations where patients have been or need to be monitored. The use of GPS coordinates enables precise tracking and location of these places, facilitating effective follow-up and intervention.

Output: A suitable healthy environment:

- Quantitative and qualitative follow-up of communicable and endemic diseases.
- Diseases are limited and confined.
- Continuous reminders of children's health care and follow-up of their vaccinations.

[129] For information see: Majeed Al-Karkhi, Statistics, Forecasting and Strategic Planning, Arab Institute for Training and Statistical Research, First Statistical Conference, Amman, 2007

- The health visitor and his periodic follow-up to the various environmental sites.

The imposed cooperation between the health institution and the rest of the other service institutions.

5- Recreational service information system: The system described shares a common framework with geographic information systems and community systems. It follows a sequence of stages, starting with inputs and progressing through institutional processes to deliver outputs that meet the needs of the community. These services are aimed at providing citizens with leisure and relaxation options, catering to their preferences and desires. However, these systems are still in the process of development and growth, continuously evolving to better serve the community. They strive to enhance the well-being of individuals and improve their quality of life by adapting to technological advancements and changing societal demands. By integrating various components, these systems aim to provide accurate, efficient, and tailored services that align with the community's expectations. **(130).**

Inputs to the recreational service institution (**(131)**is divided into:

- Open green spaces
- Gardens inside the residential shops.
- The citizen requesting the entertainment service continued to provide this service.
- Those who fully provide the service (engineer, employee, worker, administration...).

6- The operations required by the service institution: The operations involved in this process encompass multiple aspects, ranging from supplying and planting the seedlings to ensuring their continuous care. It entails providing the necessary conditions for germination and nurturing the seedlings to enable their future growth. The objective is to develop the work in a manner that aligns with the available resources and keeps pace with ongoing developments and changes. This approach ensures that the service

[130] Najeeb Abdel Rahman Lazidi, Geographic Information Systems, Amman, Al Yazouri, without a year of reprint. pp. 165-232

131

requirements are implemented effectively, meeting the satisfaction of the citizens and assisting them in maintaining access to the available services.

Output: They are as follows- :

- Maintaining an ideal healthy environment.
- Elimination of environmental pollution.
- Preserving the residential shops and providing recovery to the population ([132])
- Being able to achieve cleanliness and the aesthetic image of the environment.
- Spend free time close to what one desires after strenuous hours of hard work.
- Finding a relationship between the individual and the residential environment and attaching to the place (the residential location) without changing it continuously and eliminating pressure on other services in areas where this service is available ([133])

[132] For information see: Safaa Abdul Karim Ahmed, a study in the theory of demand - en 128-For information see :- Idan Abdul Hassan Al-Eidani, Variation in the Spatial Distribution of Community Services in the City of Basra, unpublished PhD thesis, University of Basra, Arts, 2002.

[133] For information see: Sabah Fadel Al-Rahmani, Population Change and the Efficiency of Community Services in the Arab City, Journal of Social Studies, No. 3, Baghdad House of Wisdom, 1999.tertainment services - Journal of the Iraqi Geographical Society, Issue 34, 1990

4. RESULTS AND DISCUSSION

4.1. Impact of Urban Expansion on the Efficiency of Services

4.1.1. Educational Services

The education sector encompasses a range of services that are provided, including the human aspect, which refers to the educational staff involved at various stages of education. Additionally, spending on education plays a significant role, reflecting the level of investment and commitment to education. This can be measured through various indicators such as the number of schools available in relation to the number of students, the number of classrooms, and the overall area of schools. Financial allocations allocated to education serve as a crucial indicator for assessing the development and current state of the education system. **(134)**. These services also affect determining the extent of Progress in education and its role in demonstrating the extent of the efficiency of these services as they constitute one of the basic criteria for measuring the quality and quality of life of the residents of the governorate by defining the criteria involved in the educational process. Therefore, the need comes in analyzing the efficiency of educational services and their centers of progress to determine the levels of the spatial relationship between educational services and the population, which would clarify the quality or inability to meet and provide educational services **(135)**.

The Millennium Development Annual Report of the United Nations also stressed the need to measure the level of education by knowing the enrollment rate, the rate of reading and writing for adults aged 15 and over, and the rate of enrollment in primary, secondary, and higher education, as it represents an important indicator for the development of current and future human resources **(136)**. In Iraq, there are a total of 20,729 schools catering to both male and female students. Among these, 14,024 schools are primary schools, accounting for approximately 67.6% of the total. Government

[134] Mansour Al-Rawi, Population of the Arab World, An Analytical Study of Demographic Problems, Part One, Baghdad, House of Wisdom, 2002, p. 240.
[135] Bashir Ibrahim Latif, Cities Services, 1st edition, The Lebanese Foundation, 2009, p. 109.
[136] United Nations Human Development Report, 2007/2008, United Nations Development Program (UNDP), p. 285

schools make up the majority, with a percentage of 94.8%, followed by private schools at 5.0%, and religious schools at 0.2%. Within the governorate, the number of primary schools amounts to 2,654 schools. Girls' schools account for 426 schools, representing 14.1% of the total, while boys' schools' amount to 524 schools, constituting 17.4%. Mixed schools, where both boys and girls study together, reach a total of 1,704 schools, making up 68.5% of the primary schools in the governorate. (137). Due to the distribution of villages on the outskirts of the governorate, many schools, regardless of type, are typically located in rural areas. This sometimes requires students to travel 2-3 kilometers to reach school, especially in certain villages. In terms of secondary schools, there are 1,464 schools across Iraq, accounting for 22.2% of the total secondary schools. Girls' secondary schools' amount to 613, representing 41.9% of the secondary schools in the governorate, while boys' secondary schools reach 729, making up 49.8%. Mixed secondary schools account for 122 schools, with a rate of 8.3%. (138)

Although gender segregation is a fundamental principle in Iraqi schools, there are a significant number of mixed schools, particularly in rural areas. These mixed schools constitute a small proportion, around 100 schools, representing 35.7% of vocational schools in Iraq, which total 280 schools. It is worth noting that the number of government schools has seen an increase in recent years. (139). It is noted that the number of government schools has increased. To a large extent, this coincides with Iraqi education and comes within the future directions of the state's plans to make education a priority for planning and sustainable development. Private schools have also begun to increase in recent years due to the high level of income of some families, especially those with high and middle incomes, and because of the occupancy rate in public schools, in which the number of students reaches between (40-60) male / female students, and the number may exceed that much. Furthermore, it is important to note that a significant number of schools in Iraq operate in multiple shifts, commonly known as double or triple shifts. This duplication of schools affects the duration of study hours for students. Many families, seeking better educational opportunities and higher-quality

[137] Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Statistical Bulletin for Primary Education, Table (3), for the year 2022, p. 11

[138] Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Statistical Bulletin for Secondary Education, Table (3), year 2022, p. 13

[139] Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Statistical Bulletin for Vocational Education, Table (3), year 2022, p. 13

facilities, opt for private schools over government schools. The number of private schools in Iraq has reached 392, including 227 primary schools with a total student enrollment of 46,070, and 165 secondary schools with a total student enrollment of 20,292. Private schools provide additional options for families seeking alternative educational paths for their children. **(140).**

Table 6: Differences in schools in different areas

N	Administrative units	Number of students	number of Teachers	number of rows	Total schools	the total	standard score
1	M.S. Rusafa	24625	2428	704	70	27827	-0.49
2	Eastern Karrada	115474	3498	2517	134	121923	0.46
3	New Baghdad	490153	17718	9735	574	518180	4.46
4	Palestine	27385	1430	795	56	29666	-0.47
5	Adhamiya	68126	5363	1928	145	75562	-0.01
6	Rashidiya	32117	2037	823	89	35066	-0.42
7	Al-Fahhama	149959	7674	3527	242	161402	0.86
8	Flowers	63207	4224	2079	100	69610	-0.07
9	M. Q. Sadr 2	14311	1031	384	42	15768	-0.61
10	Sons of Mesopotamia	43733	2167	1050	93	47043	-0.30
11	Medina	72892	3143	1704	119	77858	0.01
12	M. Q. Al-Sadr 1	32875	1678	791	114	35458	-0.41
13	the older friend	44210	1959	1026	108	47303	-0.29
14	Euphrates	92085	3805	2122	221	98233	0.22
15	Al-Karkh	23846	1960	724	71	26601	-0.50
16	Mansour	102077	10059	2991	222	115349	0.39
17	Al-Mamoun	287335	14779	6964	292	309370	2.35
18	Al-Kadhimiya	101192	2570	6023	232	110017	0.34
19	with chains	48173	1496	1220	80	50969	-0.26
20	Coronary	58968	1827	1356	105	62256	-0.14
21	Mahmoudia	38993	2875	1213	126	43207	-0.34

[140] Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Statistical Bulletin for Primary Education, 2021-2022, Table (58), p. 83

22	Tangerine	33832	2195	1042	122	37191	-0.40
23	Latifia	27664	1715	841	89	30309	-0.47
24	Rational	29917	2085	857	98	32957	-0.44
25	M. Q Abu Ghraib	44971	2650	1039	110	48770	-0.28
26	n. Victory and	48046	2553	1559	151	52309	-0.24
27	Tarmiya	20973	1253	581	53	22860	-0.54
28	Watching	13870	678	467	43	15058	-0.62
29	M. Al-Abaiji	6479	443	197	29	7148	-0.70
30	M. Q. Al-Madaen	39788	4428	3033	83	57332	-0.19
31	the bridge	52118	1742	1073	79	55012	-0.22
32	M. Unit	71861	1893	1138	125	7517	-0.70
						Arithmetic mean	76410.34
						standard deviation	98952.63

Source: Ministry of Education, Directorates of First Rusafa Education, Second Rusafa Education, Third Rusafa, Planning Department, Statistics Division, unpublished data, 2022. Ministry of Education, Directorates of First Karkh Education, Second Karkh Education, Third Karkh Education, Planning Department, Statistics Division, unpublished data, 2022 Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Statistical Bulletin for Primary, Secondary and Vocational Education, for the year 2022

Table 6 shows that there is a discrepancy in the level of education services, as they were distributed according to the standard score as follows:

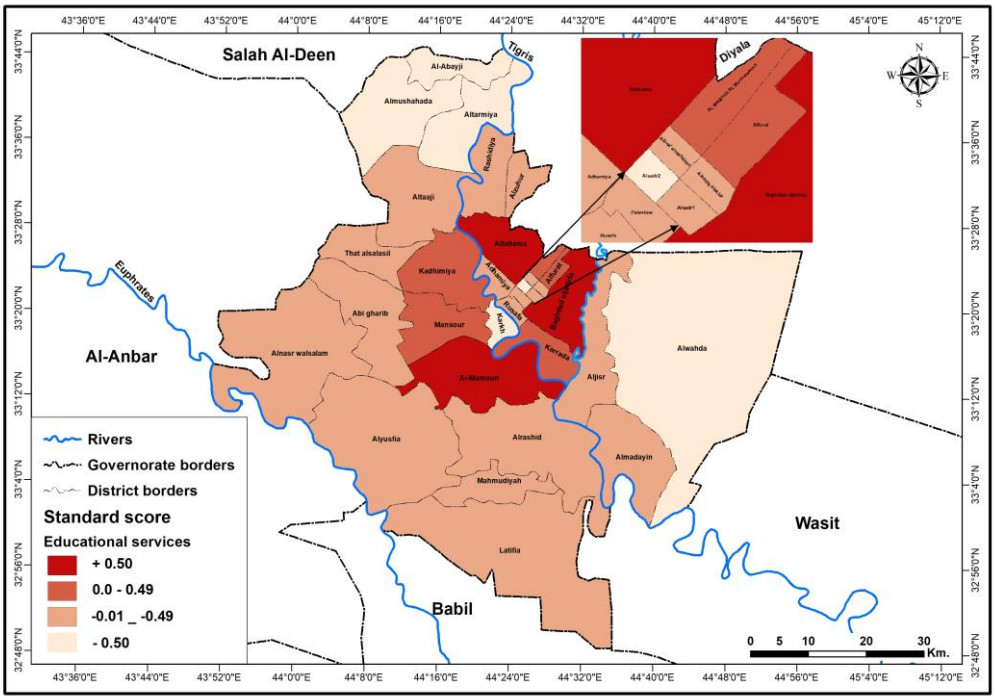
The first level included three administrative units (Baghdad Al-Jadida, Al-Mamoun, and Al-Fahhama), with rates of (20.6%, 12.3%, and 6.4%) due to the high population size of (15.5%, 12.6%). , 7.9%), which led to an increase in the number of students enrolled and the tendency of many families to direct their children to education because they realize its importance despite the deteriorating economic conditions and the lack of job opportunities, especially in the Fahama district.

The second level included four administrative units (Eastern Karrada, Mansour, Kadhimiya, and Al-Furat) with rates of (4.8%, 4.6%, 4.4%, 3.9%), as the level of these units increased due to the increase in family income, which helps directed their children to education, especially towards private schools for their ability to bear the high costs of education, while the Euphrates came affected by the size of the population and the high number of schools in it.

The third level included eighteen units (Al-Munawara, Al-Adhamiya, Al-Wahda, Al-Zuhur, Al-Taji, Al-Madain, Al-Nasr and Al-Salam, That Al-Salasil, Abnaa

Al-Rafidain, Al-Siddiq Al-Akbar, Abu Ghraib, Al-Mahmudiyah, Al-Yousufia, Al-Sadr 1, Al-Rashidiyah, Al-Rasheed, Palestine, Al-Latifiya, and the percentages ranged Between (3.0%-1.2%).

The fourth level consists of seven administrative units (Al-Rusafa, Al-Karkh, Al-Tarmiyah, Al-Sadr 2, Al-Mashahda, Al-Abaiji) appeared, with rates ranging between (1.1%-0.6%).



Map 7: Shows that there is a discrepancy in the level of education services, as they were distributed according to the standard score.

Source: From the work of the researcher, relying on the Ministry of Water Resources, the General Commission for Survey, the Division of Map Production, the administrative map of Baghdad Governorate, at a scale of 1:250,000, for the year 2020. Source No. 2 is added with it: it is the number of the table that was relied upon in mapping

4.1.1.1. Distribution of Student/Teacher Ratio

The teacher is the main axis in the educational process, as through it we can determine the efficiency of the educational service because it is able to raise the scientific value of education. Therefore, the planning process for the distribution of educational cadres in a manner commensurate with the numbers of students is the axis of the educational process in society. The table (6) and map (7) showed the level of distribution of the teaching staff varied according to what came within the specified criterion, student or teacher. It was distributed according to the standard score as follows:

The first level: In eight units, namely Al-Kadhimiya, Al-Wahda, Eastern Karrada, Al-Taji, That Al-Salasil, Al-Jisr, New Baghdad, and Al-Mashahda, certain trends and challenges were observed. These units reported the highest rates of deficit in teaching staff, with percentages of 92.1%, 87.2%, 62.6%, 57.6%, 57.6%, 47.8%, 37.9%, and 33.0% respectively. This indicates a shortage of qualified teachers in these areas.

Moreover, an increase in the student-to-teacher ratio was noted in these units, reflecting higher student numbers compared to available teaching staff. The highest concentration of students was observed in New Baghdad, with a rate of 21.0%, while the lowest concentration was in observation at 0.6%. These concentrations exceeded the standard set by the Ministry of Education, which recommends a student-to-teacher ratio of 25-30 students per teacher.

The second level: These six administrative units, namely Al-Furat, Al-Munawwarah, Al-Siddiq Al-Akbar, Abna Al-Rafidain, Al-Fahama, and Al-Sadr 1, experienced relatively lower rates of deficit in teaching staff, ranging from -13.3% to -1.5%. This suggests that these units had a surplus of teaching staff compared to the required number. In terms of student concentration, these units reported percentages ranging from 4.0% to 1.4%, indicating a moderate level of student density. Similarly, the staff concentration in these units ranged from 3.3% to 1.5%, suggesting an appropriate balance between the number of teachers and students, closer to the local standard.

The third level: It included of eight administrative units, namely Al-Ma'mun, Palestine, Victory and Peace, Abu Ghraib, Al-Tarmiya, Al-Latifiya, Al-Rashidiya, and Al-Yousifiyah, revealed deficits in teaching staff ranging from 6.4% to 21.2%. These units had a higher shortage of teaching staff compared to the general standards,

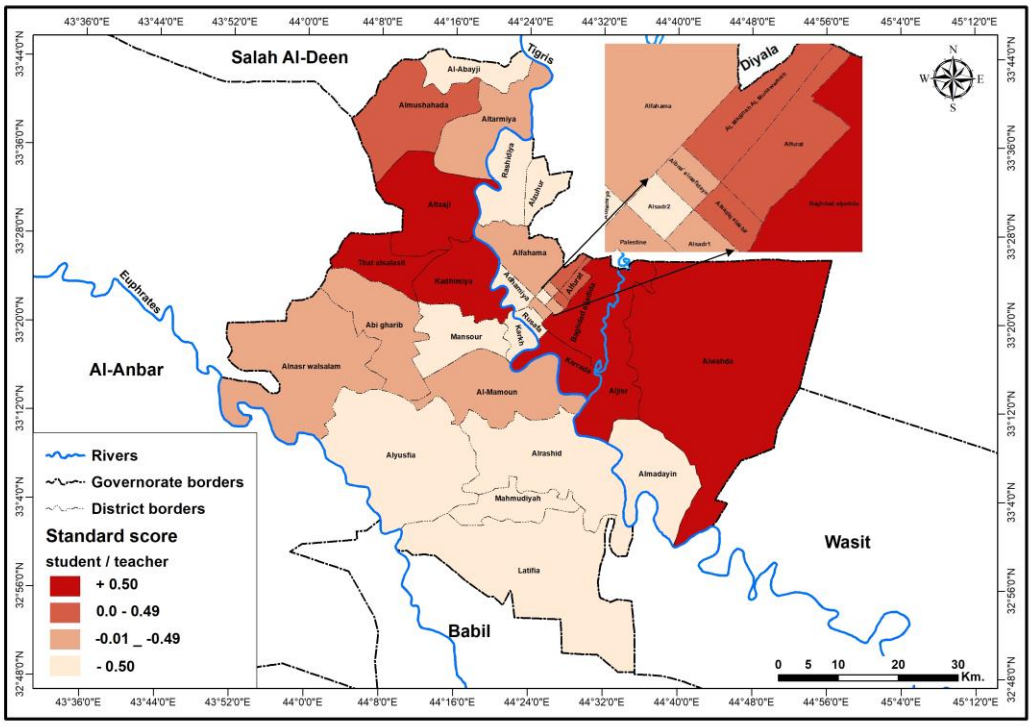
indicating a need for additional educators in these areas. Regarding student concentration, the highest percentage was observed in Al-Ma'mun at 12.3%, indicating a relatively higher density of students in that area. On the other hand, Al-Tarmiya had the lowest concentration rate, suggesting a lower density of students in that particular administrative unit.(%0.9)

The fourth level: Ten administrative units, namely Al-Zuhur, Al-Rasheed, Al-Sadr 2, Al-Mahmudiyah, Al-Adhamiya, Al-Karkh, Al-Madaen, Al-Mansour, Al-Rusafa, and Al-Abaiji, had a lower number of students per teacher compared to the general average. The student-to-teacher ratio was highest in Al-Zuhur with 16 students per teacher and lowest in Al-Abaiji with 9 students per teacher. This indicates a decrease from the local standard, with ratios ranging from 26.1% to 50.7%. The highest concentration percentage of students was observed in Al-Mansour district at 4.4%, indicating a relatively higher density of students in that area. Conversely, Al-Abaiji had the lowest concentration rate at 0.3%, suggesting a lower density of students in that administrative unit. The data suggests a correlation between the high rate of teaching staff shortage and the high population density in these administrative units, as well as the high enrollment in schools. This has resulted in a higher number of students compared to the teacher index, reflecting the impact of these factors on the student-to-teacher ratio.

Table 7: Distribution of standard scores for educational services distribution rates in Baghdad Governorate, according to administrative units in 2022

	Administrative unit	Average** student/teacher	deficit * surplus	Standard score	Student/Division rate	deficit surplus***	Standard score	student/school rate	deficit surplus***	Standard score
1	M.S. Rusafa	10	-50,7	**-1.26**	35	-7,9	**-0.29**	352	-36,3	**-0.62**
2	Eastern Karrada	33	62,6	**1.54**	46	21,1	**0.95**	863	55,9	**2.17**
3	New Baghdad	28	37,9	**0.93**	50	31,6	**1.40**	854	54,4	**2.12**
4	Palestine	19	-6,4	**-0.16**	34	-10,5	**-0.40**	489	-11,6	**0.13**
5	Adhamiya	13	-36,0	**-0.90**	35	-7,9	**-0.29**	470	-15,0	**0.02**
6	Rashidiya	16	-21,2	**-0.53**	39	2,6	**0.16**	361	-34,7	**-0.57**

7	Al-Fahhama	20	-1,5	**-0.04**	43	13,2	**0.61**	620	12,1	**0.84**
8	Flowers	15	-26,1	**-0.65**	30	-21,2	**-0.85**	632	14,3	**0.91**
9	M. Q. Sadr 2	14	-31,0	**-0.77**	37	-2,6	**-0.06**	341	-38,3	**-0.68**
10	. Sons of Mesopotamia	20	-1,5	**-0.04**	42	10,5	**0.50**	470	-15,0	**0.02**
11	Medina	23	-13,3	**0.32**	43	13,2	**0.61**	316	10,8	**-0.82**
12	M. Q. Al-Sadr 1	20	-1,5	**-0.04**	42	10,5	**0.50**	288	-47,9	**-0.97**
13	the older friend	23	13,3	**0.32**	43	13,2	**0.61**	409	-26,0	**-0.31**
14	Euphrates	24	18,2	**0.45**	43	13,2	**0.61**	417	-24,6	**-0.27**
15	Al-Karkh	12	-40,9	**-1.02**	33	-13,2	**-0.51**	336	-39,2	**-0.71**
16	Mansour	10	-50,7	**-1.26**	34	-10,5	**-0.40**	460	-16,8	**-0.03**
17	Al-Mamoun	19	-6,4	**-0.16**	41	7,9	**0.39**	984	77,9	**2.83**
18	Al-Kadhimiya	39	92,1	**2.27**	17	-55,3	**-2.31**	436	-21,2	**-0.16**
19	with chains	32	57,6	**1.42**	39	2,6	**0.16**	602	8,9	**0.74**
20	Coronary	32	57,6	**1.42**	43	13,2	**0.61**	562	1,6	**0.52**
21	Mahmoudia	14	-31,0	**-0.77**	32	-15,8	**-0.63**	309	-44,1	**-0.86**
22	Tangerine	16	-21,2	**-0.53**	32	-15,8	**-0.63**	277	-49,9	**-1.03**
23	Latifia	16	-21,2	**-0.53**	33	-13,2	**-0.51**	311	-43,8	**-0.85**
24	Rational	14	-31,0	**-0.77**	35	-7,9	**-0.29**	305	-44,8	**-0.88**
25	M. Q Abu Ghraib	17	-16,3	**-0.41**	43	13,2	**0.61**	409	-26,0	**-0.31**
26	n. Victory and peace	19	-6,4	**-0.16**	31	-18,4	**-0.74**	318	-284	**-0.81**
27	Tarmiya	17	-16,3	**-0.41**	36	-5,3	**-0.18**	396	-28,4	**-0.38**
28	Watching	27	33,0	**0.81**	30	-21,1	**-0.85**	323	-41,6	**-0.78**
29	M. Al-Abaiji	9	-55,7	**-1.38**	33	-13,2	**-0.51**	223	-59,7	**-1.33**
30	M. Q. Al-Madaen	12	-40,9	**-1.02**	16	-57,9	**-2.42**	600	8,5	**0.73**
31	the bridge	30	47,8	**1.18**	49	28,9	**1.29**	600	8,5	**0.73**
32	M. Unit	38	87,2	**2.15**	63	65,8	**2.86**	575	4,0	**0.60**
	the total	651			1202			15263		
	The general rate of the province	%20,3			38			553		
		Arithmetic mean		20.34	Arithmetic mean		37.56	Arithmetic mean		465.87
		standard deviation		8.20	standard deviation		8.89	standard deviation		183.25



Map 8: Distribution of standard scores for educational services distribution rates in Baghdad Governorate, according to administrative units in 2022

Source: From the work of the researcher, relying on the Ministry of Water Resources, the General Commission for Survey, the Division of Map Production, the administrative map of Baghdad Governorate, at a scale of 1:250,000, for the year 2020. Source No. 2 is added with it: it is the number of the table that was relied upon in mapping

4.1.1.2. Distribution of Student/ Section Ratio

At the level of a student/section: it is represented by the amount occupied by students from the section, as the Ministry of Education determined that the amount occupied by a student/section ranges between (25-36) between the academic stages, and through a table 10 and map 8 showing four levels of distribution according to the standard score:

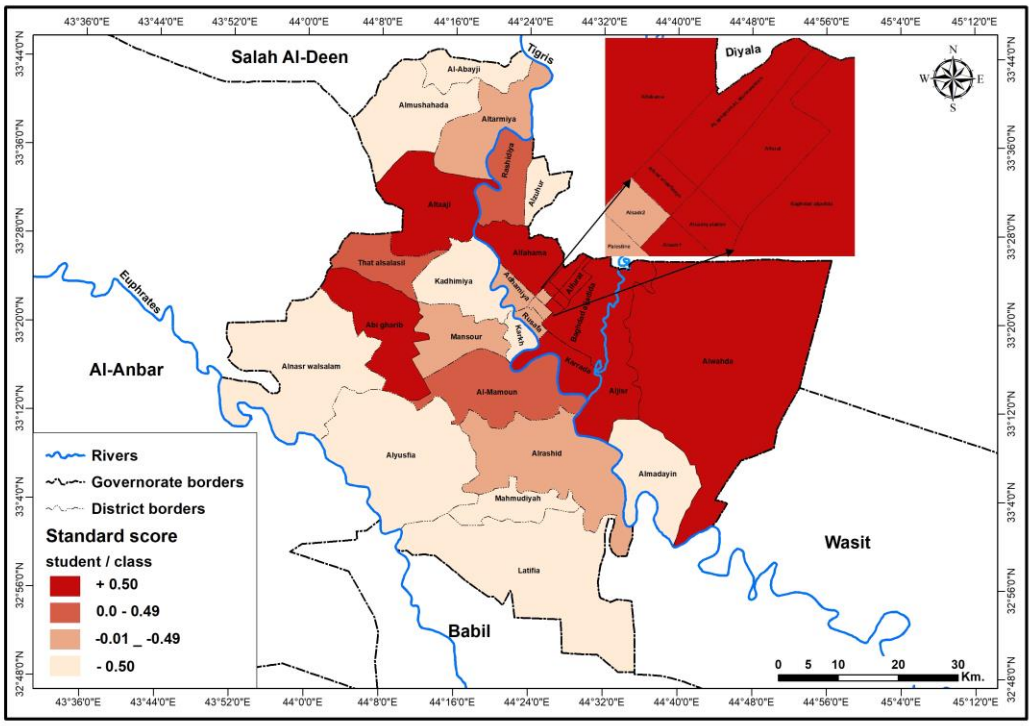
The first level: There are ten administrative units where the number of students per section exceeds the standard and average for the governorate. These units include New Baghdad, Al-Jisr, Eastern Karrada, Al-Taji, Al-Furat, Abu Ghraib, Al-Siddiq Al-Akbar, Al-Munawwarah, and Al-Fahama. The average number of students per section

in these units ranges from 46 to 63, indicating a higher student-to-section ratio compared to the standard. This increase in the number of students per section can be attributed to factors such as the high population size, rapid population growth rates, and high enrollment rates in schools within these units. The high student-to-teacher ratio can pose challenges for teachers, as it creates an environment that may not be conducive to fostering creativity and individual attention to students. Additionally, this situation may contribute to increased dropout rates or lower academic achievement among students, particularly among male students. It's worth noting that specific strategies and actions to address these challenges would depend on the local context and policies implemented by the Ministry of Education or educational authorities in the region.

The second level: It included five units namely Abna Al-Rafidain, Al-Sadr 1, Al-Ma'mun, That Al-Salasil, Al-Rashidiyah with averages of (42, 42, 41, 39, 39) with a deficit ranging between.(%2.6 ,%10.5)

The third level: It included seven administrative units of Al-Sadr 2, Al-Tarmiya, Al-Adhamiya, Al-Rusafa, Al-Rasheed, Palestine, Al-Mansour with a rate ranging between (37-34) with a deficit between (2.6-%-10.5-%). The rates fell below the average. .

The fourth level: It included ten units in which the rate decreased significantly, which are Al-Karkh, Latifia, Al-Abaiji, Yusufiyah, Al-Mahmudiyah, Al-Nasr Al-Salam, Al-Zuhur, Al-Mashada, Al-Kadhimiya, Al-Madain. The rate ranged between (16-33) and most of the units recorded an average that was close to the standards Global and local, as it ranged between (13.2-%-57.9-%), and this is because the administrative units are dominated by rural areas.



Map 9: Distribution of Student/Section Ratio

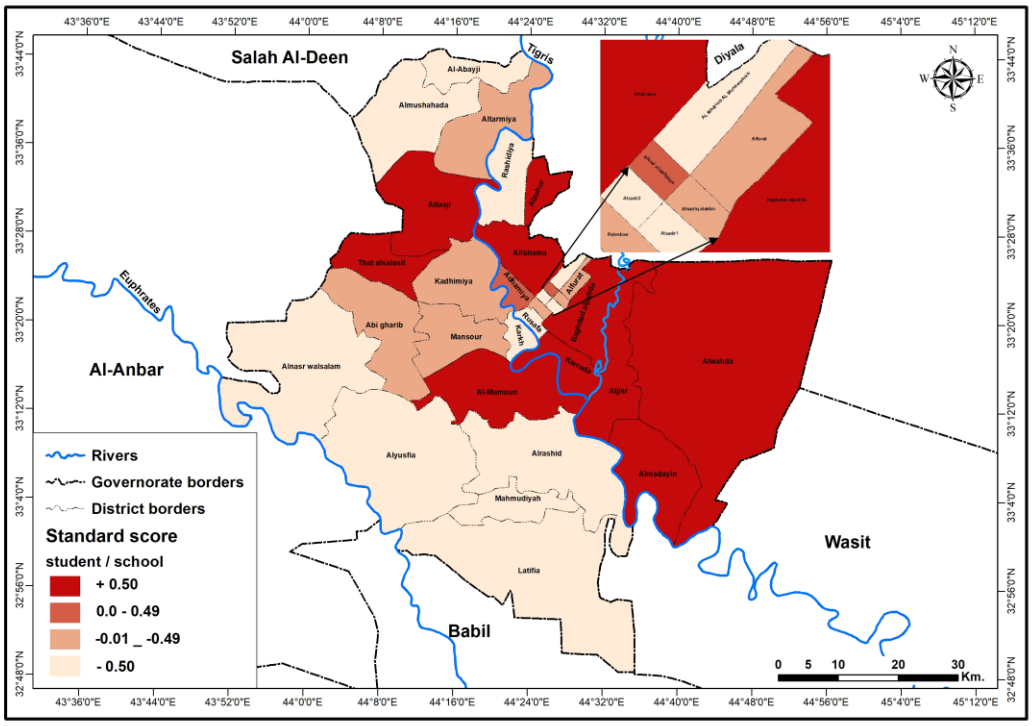
Source: From the work of the researcher, relying on the Ministry of Water Resources, the General Commission for Survey, the Division of Map Production, the administrative map of Baghdad Governorate, at a scale of 1:250,000, for the year 2020. Source No. 2 is added with it: it is the number of the table that was relied upon in mapping.

4.1.1.3. Distribution of Student / School Ratio

While the criterion of student / school distribution came with a high disability in most of the administrative units, as shown in Table (10) and Map (9) as the distribution came in four levels according to the standard score, as follows:

The first level: It included ten units namelyAl-Ma'moon, Eastern Karrada, New Baghdad, Al-Zuhur, Al-Fahamah, Al-Munawwarah, That Al-Salasil, Al-Madaen, Al-Jisr, Al-Wahda at a rate higher than the general average for the governorate of (553) students / schools. The average number of students per school in the sub-districts ranged from 575 to 984, indicating varying levels of overcrowding. The deficits in student-to-school ratios were significant, ranging from 8.5% to 77.9%, with some sub-districts experiencing higher deficits than others. The sub-districts with the highest deficits faced

greater challenges in managing the large number of students per school. The concentration rate of schools varied as well, with New Baghdad sub-district having the highest concentration rate of 13.6%, while Al-Jisr and Thath Al-Salasil sub-districts had the lowest concentration rates of 1.9% each. These concentration rates indicate the proportion of schools operating multiple shifts to accommodate the high number of students. The Ministry of Education has implemented solutions to address the overcrowding issue, although they may not be ideal. One approach has been to implement double or triple shifts in most schools in the province. This means that schools operate in multiple shifts throughout the day to accommodate more students.



Map 10: Distribution of Student School Ratio

Source: From the work of the researcher, relying on the Ministry of Water Resources, the General Commission for Survey, the Division of Map Production, the administrative map of Baghdad Governorate, at a scale of 1:250,000, for the year 2020. Source No. 2 is added with it: it is the number of the table that was relied upon in mapping.

Table 8: Distribution of the primary schools in Baghdad governorate, according to the administrative units, for the year 2022

N		Urban				the countryside				the total					
	Administrative	the ori	%	disability	%	the orig	%	Disability	%	the ori	%	disability	%	the	%
1	M.S. Rusafa	51	2,2	19	1,8	0	0	0	0	51	1,8	19	1,4	70	1,7
2	Eastern Karrada	96	4,1	38	3,7	0	0	0	0	96	3,3	38	2,9	134	3,2
3	New Baghda	325	13,9	249	240,	0	0	0	0	325	112,	249	189,	574	136,
4	Palestine	45	1,9	11	1,1	0	0	0	0	45	1,6	11	0,8	56	1,3
5	Adhamiya	125	5,4	20	1,9	0	0	0	0	125	4,3	20	1,5	145	3,4
6	Rashidiya	10	0,4	9	0,9	42	7,4	28	10,1	52	1,8	37	2,8	89	2,1
7	Al-Fahham	161	6,9	81	7,8	0	0	0	0	161	5,5	81	6,2	242	5,7
8	Flowers	47	2,0	53	5,1	0	0	0	0	47	1,6	53	4,0	100	2,4
9	M. Q. Sadr 2	39	1,7	3	0,3	0	0	0	0	39	1,3	3	0,2	42	1,0
10	. Sons of Mesopotamia	83	3,6	10	1,0	0	0	0	0	83	2,9	10	0,8	93	2,2
11	Medina	91	3,9	28	2,7	0	0	0	0	91	3,1	28	2,1	119	2,8
12	M. Q. Al-Sadr	69	3,0	45	4,3	0	0	0	0	69	2,4	45	3,4	114	2,7
13	the older	80	3,4	28	2,7	0	0	0	0	80	2,8	28	2,1	108	2,6
14	Euphrates	162	6,9	59	5,7	0	0	0	0	162	5,6	59	4,5	221	5,2
15	Al-Karkh	59	2,5	12	1,2	0	0	0	0	59	2,0	12	0,9	71	1,7
16	Mansour	189	8,1	33	3,2	0	0	0	0	189	6,5	33	2,5	222	5,6
17	Al-Mamou	195	8,4	97	9,3	0	0	0	0	195	6,7	97	7,4	292	6,9
18	Al-Kadhim	188	8,1	44	4,2	0	0	0	0	188	6,5	44	232	5,5	
19	with chains	25	1,1	20	1,9	24	4,2	11	4,0	49	1,7	31	2,4	80	1,9
20	Coronary	27	1,2	14	1,3	48	8,4	16	5,8	75	2,6	30	2,3	105	2,5
21	Mahmoudia	42	1,8	21	2,0	39	6,8	24	8,8	81	2,8	45	3,4	126	3,0
22	Tangerine	18	0,8	14	1,3	78	137,	12	4,3	96	3,3	26	2,0	122	2,9

23	Latifia	10	0,4	13	1,3	40	7,0	26	9,4	50	1,7	39	3,0	89	2,1
24	Rational	20	0,9	16	1,5	46	8,1	16	5,8	66	2,3	32	2,4	98	2,3
25	M. Q Abu	48	2,1	17	1,6	25	4,4	20	7,2	73	2,5	37	2,8	110	2,6
26	n. Victory	33	1,4	15	1,4	79	138,	24	8,8	112	3,9	39	3,0	151	3,6
27	Tarmiya	10	0,4	12	1,2	18	3,2	13	4,7	28	1,0	25	1,9	53	1,3
28	Watching	0	0	0	0	23	4,0	20	7,2	23	0,8	20	1,5	43	1,0
29	M. Al-Abaiji	0	0	0	0	13	,23	16	5,8	13	0,4	16	1,2	29	0,7
30	M. Q. Al-	18	0,8	18	1,7	22	3,8	25	9,1	40	1,4	43	3,3	83	2,0
31	the bridge	26	1,1	20	1,9	23	4,0	10	3,6	49	1,7	30	2,3	79	1,9
32	M. Unit	39	1,6	20	2,1	51	8,9	15	5,4	90	3,1	35	2,7	125	3,0
	the total	2113	100	1039	100	571	100	276	100	2902	100	1315	100	4217	100

The second level: In the units of Al-Taji and Palestine, the average number of students per school was 562 and 470 respectively. These averages indicate a relatively high number of students compared to the governorate's average. The student-to-teacher ratio in these units also exceeded the governorate's average, with deficits of 1.6% and 11.6% respectively, indicating a higher demand for teachers to accommodate the large number of students. The concentration rates in these units were 2.5% and 1.2% respectively, which means that a proportion of schools operated multiple shifts to handle the student population.

The third level: It included eight units namelyAl-Adhamiya, Abna Al-Rafidain, Al-Mansur, Al-Kadhimiya, Al-Furat, Al-Siddiq Al-Akbar, Abu Ghraib, Al-Tarmiya with an average of (470, 470, 460, 436, 417, 409, 409 , 396) students/teachers, and the surplus and deficit rate was (-15.0%, -15.0%, -16.8%, -21.2%, -24.6%, -26.0%, and 26.0%). -0%, -28.4%, with a concentration rate of ,%5.2 ,%5.5 ,%5.3 ,%2.2 ,%2.2) %1.3 ,%2.6. These units fell below the general average numbered.

The fourth level: It included twelve units namelyAl-Rashidiyah, Al-Rusafa, Al-Sadr 2, Al-Karkh, Al-Mashada, Al-Nasr Al-Salam, Al-Latifiyah, Al-Mahmudiyah, Al-Rasheed, Al-Sadr 1, Al-Yousifiyah, Al-Rashid, Al-Abaiji, with an average of (361-223) students / school.It is clear from the table (4-41) and figure (4-1) that there is a

discrepancy in the amount of the deficit in the number of schools, which has become insufficient to fill the shortage in them. Due to the high rates of population growth and the resulting increase in the number of enrolled students, there has been significant pressure on the capacity of schools in Baghdad governorate to accommodate this influx. As a result, certain administrative units have experienced higher deficit rates in terms of school capacity.

These units, namely Baghdad Al-Jadida, Al-Fahhama, Al-Furat, and Al-Mamoun, have deficit rates of 18.9%, 6.2%, 4.5%, and 7.4% respectively.The lowest percentage was recorded in Palestine, Al-Sadr 2, Abnaa Al-Rafidain, and Al-Karkh, with rates of 0.8%, 0.2%, 0.8%, and 0.9% respectively. These units also had deficits of 11, 3, 10, and 12 schools. On the rural level, the districts of Al-Rashidiya, Latifiya, Mahmoudiya, Al-Nasr, and Al-Salam had the highest deficit rates of 10.1%, 9.4%, 8.7%, and 8.8% respectively. There are numerous challenges facing the educational process in Iraq, particularly in the province of Baghdad, which bears a significant population burden. These challenges have resulted in a decline in the quality of education, including issues related to the distribution of educational staff, the student-to-school ratio, school infrastructure capacity, and the prevalence of unemployment and poverty. These factors have adversely affected the residents' quality of life and their satisfaction with the education system, especially at the elementary school level, which often faces challenges due to time constraints and inadequate resources. **(141)**. Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Statistical Bulletin for Primary, Secondary and Vocational Education, for the year 2022.

[141] Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Directorate of Social and Educational Statistics, Statistics of Kindergartens in Iraq, Table (1), year 2022, p. 3.2. Ministry of Education, First Karkh Education Directorate, Second Karkh Education Directorate, Third Karkh Education Directorate, Planning Department, Statistics Division, unpublished data for the year 2022.

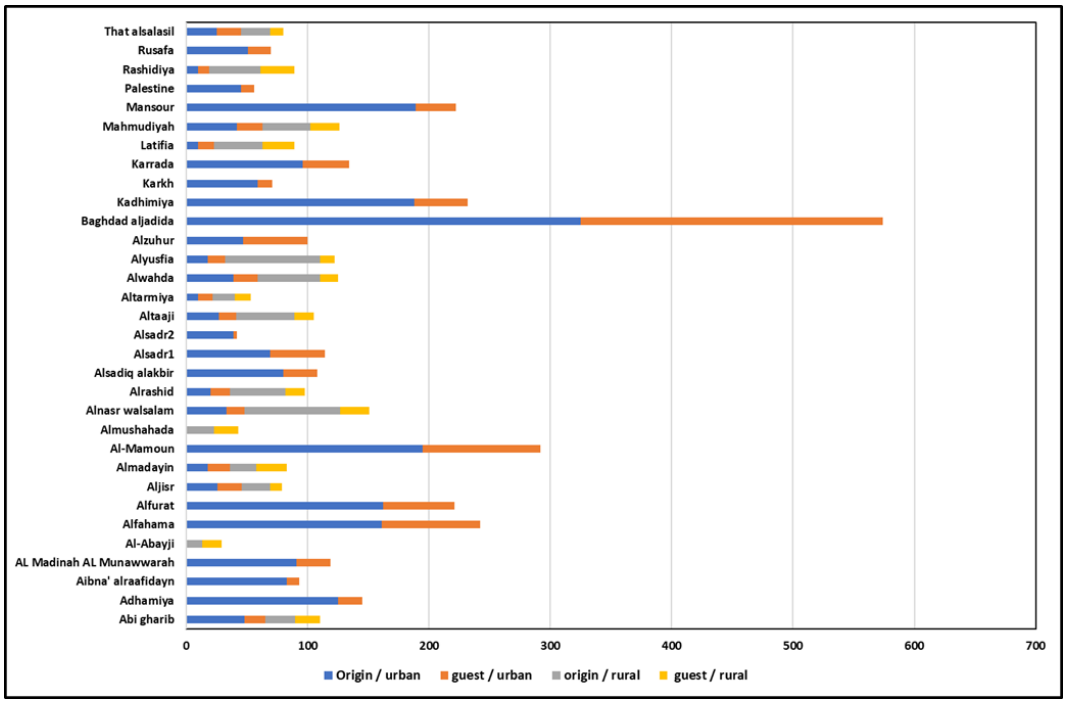


Figure 2: Distribution of the number of primary and schools in Baghdad Governorate, according to administrative units for the year 2022

As for the kindergarten level, the number of kindergartens in Iraq in 2012 was 967, out of which 690 were governmental and 277 were private. The total number of students enrolled in kindergartens was 193,358, and the number of teachers was 4,400, indicating a student-to-teacher ratio of 44.4%. The number of enrolled students in government kindergartens was 186,816. Table 11 and figure 4 show the variation in distribution at the level of administrative units, as the number of kindergartens increases in the districts of Al-Ma’mun, Al-Mansur, New Baghdad, Al-Karkh, Al-Karrada, Al-Sharqiya, Al-Adhamiya, where the number of children reached (41, 38, 27, 26, 24, 23)., The increase in the number of kindergartens in the governorate is due to the effect of the population size, the high level of income of families and the lack of unemployment.

The district of Al-Yusufiyah, Al-Latifiyah, Al-Rasheed, Abu Ghraib, and Al-Madaen recorded the lowest number of kindergartens, with only one kindergarten in total. This decrease in the number of kindergartens is primarily observed in administrative units that include rural areas. The quality of life in rural areas differs from urban centers, and there is a clear qualitative distinction in rural families. In rural settings, mothers often take on the role of raising children without the need for an additional breadwinner. Furthermore, women's participation in the workforce is limited compared to urban areas where women contribute significantly to work. In the year

2013, according to the survey of poverty and maternal mortality, there were 1,564,712 women participating in work. Due to their busy worktables, many mothers in urban areas send their children to kindergartens, which have become an auxiliary factor in raising and aiding families.

Table 9: Distribution of kindergartens (government and private) in Baghdad governorate, according to administrative units, for the year 2022

Administrative unit	Kindergarten	%	Administrative unit	Kindergarten	%
M.S. Rusafa	15	4,5	Al-Kadhimiya	15	4,5
Eastern Karrada	24	7,2	with chains	10	3,0
New Baghdad	27	8,2	Coronary	9	2,7
Palestine	19	5,8	Mahmoudia	4	1,2
Adhamiya	23	7,0	Tangerine	1	0,3
Rashidiya	2	0,6	Latifia	1	0,3
Al-Fahhama	20	6,1	Rational	1	0,3
Flowers	5	1,5	M. Q Abu Ghraib	1	0,3
M. Q. Sadr 2	5	1,5	n. Victory and peace	3	0,9
Sons of Mesopotamia	4	1,2	Tarmiya	3	0,9
Medina	5	1,5	Watching	0	0
M. Q. Al-Sadr 1	5	1.5	M. Al-Abaiji	0	0
the older friend	4	1,2	M. Q. Al-Madaen	2	0,6
Euphrates	5	1,5	the bridge	5	1,5
Al-Karkh	26	7,9	M. Unit	7	2,1
Mansour	38	11,5	the total	330	100
Al-Mamoun	41	12,7			

Source: Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Directorate of Social and Educational Statistics, Statistical Bulletin for Kindergarten, Table (2) for the year 2022, p. 6.

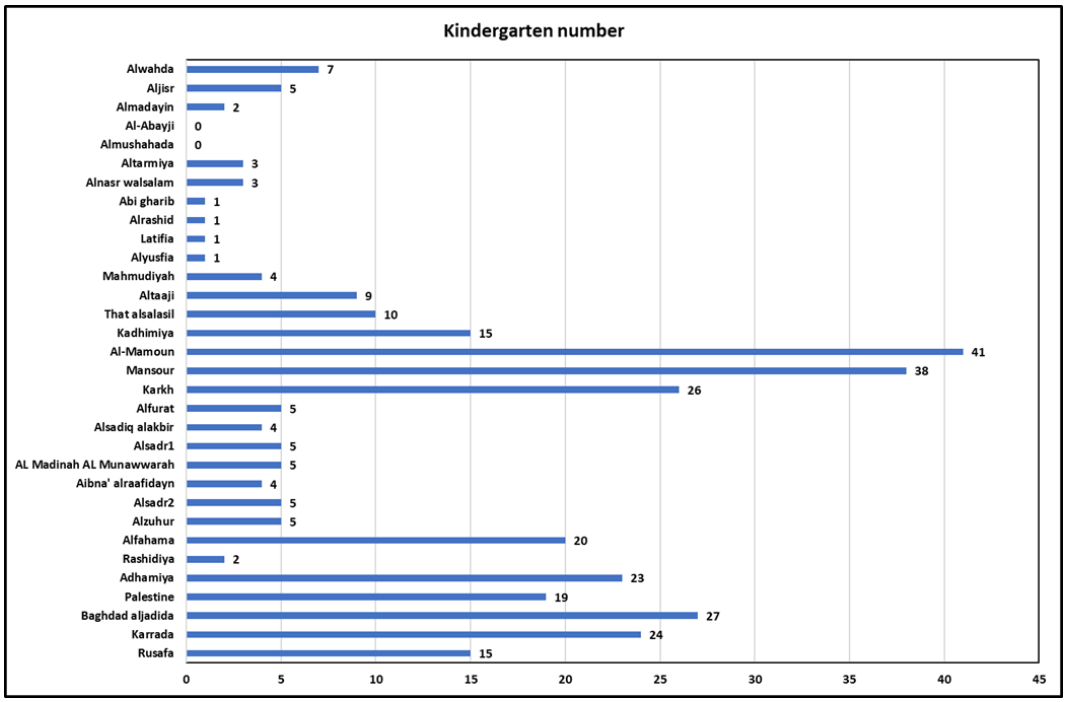


Figure 3: Distribution of kindergartens in Baghdad governorate

4.1.1.4. Enrollment of College Graduates

Iraq has experienced significant growth in the enrollment of higher education graduates. This growth can be attributed to the expansion of plans to establish universities, colleges, and scientific departments, both governmental and private. These initiatives aimed to accommodate the increasing number of middle school graduates seeking higher education opportunities. Despite the adoption of the National Strategy for Education, outlined in Cabinet Resolution No. 23 of 2012, which encompassed various aspects, including the development of a strategy to improve the quality of university education and ensure equal educational rights, the prevailing conditions in Iraq have posed challenges to achieving these goals.[(142)], In recent years, there has been a noticeable increase in the number of enrolled graduates in Iraq, as indicated by Table 5 and Figure 8.

The percentages and numbers remained relatively consistent between the years 2012 and 2015, with rates of 17.3%, 17.4%, and 17.5%. However, there was a significant

[142] Salah Abdul Qadir Al-Nuaimi, Enhancing Competitive Capabilities for Quality of Education Indicators, Challenges and Strategic Options Available for Higher Education in Iraq, Arab Organization for Administrative Development, League of Arab States, Supplement to the second issue, Volume 37, 2017, p. 26, 19

increase in the number of students in the year 2015/2016, reaching 130,488 male and female students, representing a rate of 22.7% and a difference of 5.2% compared to previous years. During the academic year 2013/2017, a total of 144,201 students graduated, with a rate of 25.2% and a change rate of 44.5% compared to 2012. The increase was particularly prominent in public universities, with a growth rate of 47.4%. Private universities and colleges also experienced a significant increase, with a change rate of 69.4%. However, the change rate for technical colleges and institutes was relatively low at 19.4% and 13.5% respectively. The changes in curricula have had an impact on students' ability to achieve the required scores for admission to public universities. The proliferation of private universities and the availability of a wide range of specializations have given students the opportunity to choose programs that align with their preferences and capabilities.

Table 10: The numerical distribution of graduates of primary studies in Iraq from the period 2012/2013-2016/2017

year	government	my parent	Technical institutes	College of Technology
2013/2012	61079	16276	19899	2518
2014/2013	58235	23880	15705	2370
2015/2014	58405	21513	18796	2134
2016/2015	80426	26951	20047	3064
2017/2016	90008	27578	23757	2858
percentage change from-2017/2012	47,4	69,4	19,4	13,5

Source: Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Directorate of Social and Educational Statistics, graduates of higher education in Iraq for the academic year 2016/2017 / p. 5.

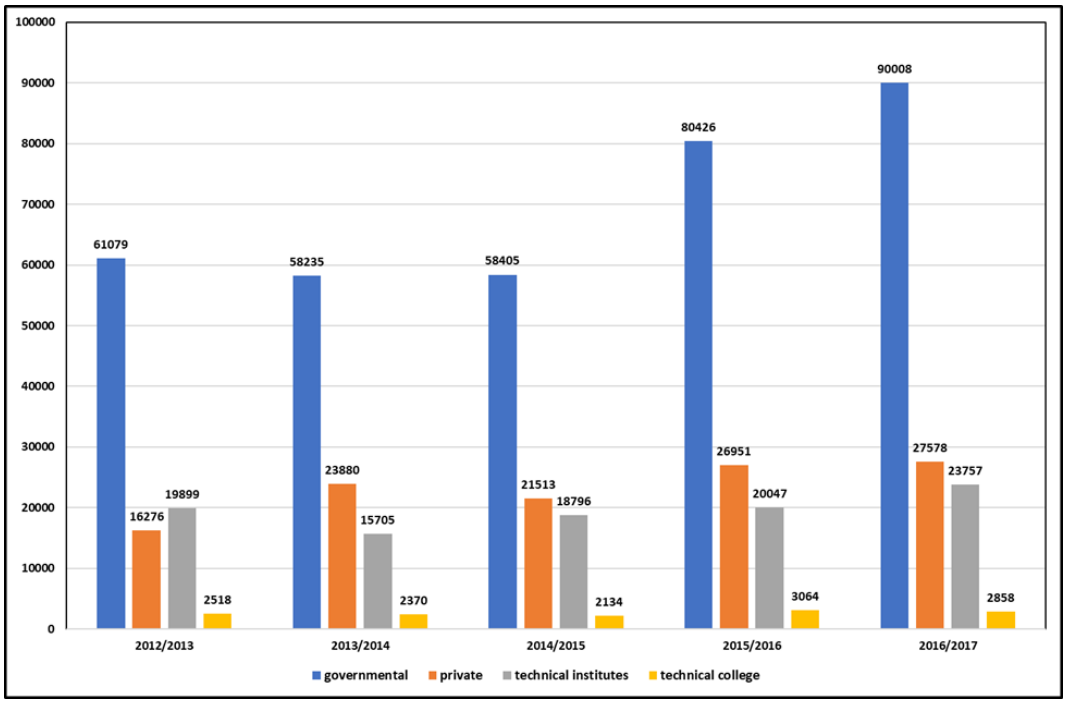


Figure 4: The numerical distribution of graduates of governmental and private colleges, institutes and technical colleges in Iraq for the year for the period (2012-2017)

4.1.1.5. Enrollment of University Graduates

As for the governorate level, it is noted from the table (12) and figure (8) that it included four universities., The number of graduates in Iraq reached 25,370, comprising both male and female students, with a graduation rate of 32.9%. Among the universities, the University of Baghdad had the highest number of graduates, totaling 3,270, with a rate of 12.9%. The University of Technology and the Two Rivers University saw a decrease in the number of graduates, with 1,438 and 741 respectively, representing rates of 5.7% and 2.9%. In terms of gender, the number of female graduates (14,101) exceeded that of males (11,269), with a difference of 11.2%. The University of Baghdad had a higher number of male graduates compared to the governorate, while the University of Mustansiriya had a higher number of female graduates. In other universities, the percentage of male graduates was higher than that of females, accounting for 39.6% of total graduates. However, the University of Mustansiriya had a higher percentage of female graduates, with 53.5% compared to 46.5% of males. Furthermore, the percentage of male graduates decreased in the University of Technology, Al-Nahrain University, and Al-Iraqiya University, where the percentage of

female graduates exceeded that of males by differences of 12%, 32.2%, and 15.8% respectively.

Table 11: The numerical and relative distribution of graduates of public universities (morning and evening) in Baghdad Governorate for the year 2016/2017

University	Males	Female	University	Higher Diploma	Master's	PhD
Baghdad University	4541	7025	Baghdad University	265	1157	253
Mustansiriya University	4468	3887	Mustansiriya University	40	549	53
Technology University	632	806	Technology University	8	71	21
Alnahrayn university	251	490	Alnahrayn university	10	198	11
Iraqi University	1377	1893	Iraqi University	2	69	0

Source: Republic of Iraq, Ministry of Planning and Development Cooperation, Central Agency for Statistics and Information Technology, Directorate of Social and Educational Statistics, graduates of higher education in Iraq for the academic year 2016/2017, p. 50

Table (7) and figure (8) show the increase in the number of graduates and postgraduate studies, as the University of Baghdad recorded the highest increase, reaching (1675), with a rate of (61.9%), followed by Al-Mustansiriya University (642) male and female students, with a rate of (23.7%), while the percentage decreased in the University of (Al-Nahrain and Iraqi Technology), with rates of (8.1%, 3.7%, 2.6%).

The governorate also experienced a significant increase in the number of private universities and colleges, totaling 21 institutions. The number of graduates from these institutions reached 16,784, consisting of both male and female students. The governorate holds great importance in terms of the number of enrolled students and graduates, as it contributes to the labor force with a diverse range of specializations acquired by the students. However, despite the availability of a large number of graduates, job opportunities remain limited, leading to high rates of unemployment. The unemployment rate in the governorate is higher than the national average, which stands at 11.3%. In the year 2013, the unemployment rate in the governorate reached 19.7%, and it further increased to 21.3% in subsequent years..(2017) One of the challenges

facing higher education and scientific research is the high number of graduates compared to the availability of job opportunities. This creates an imbalance between supply and demand in the economy.

The lack of sufficient job opportunities leads to a lower standard of living for families and contributes to the deterioration of living conditions in many regions. Moreover, there is a noticeable disparity in educational opportunities among different regions, which affects individuals' satisfaction and belief in the importance of education. The financial burden of education is another factor that influences families' decisions regarding their children's education. Many families are unable to afford the high costs associated with private colleges, especially if there are no opportunities for admission to government universities and colleges. This situation has resulted in a decline in the quality of education, as students may not be motivated to pursue learning when they perceive limited prospects for obtaining a specialization that can improve their economic and living conditions in the future.

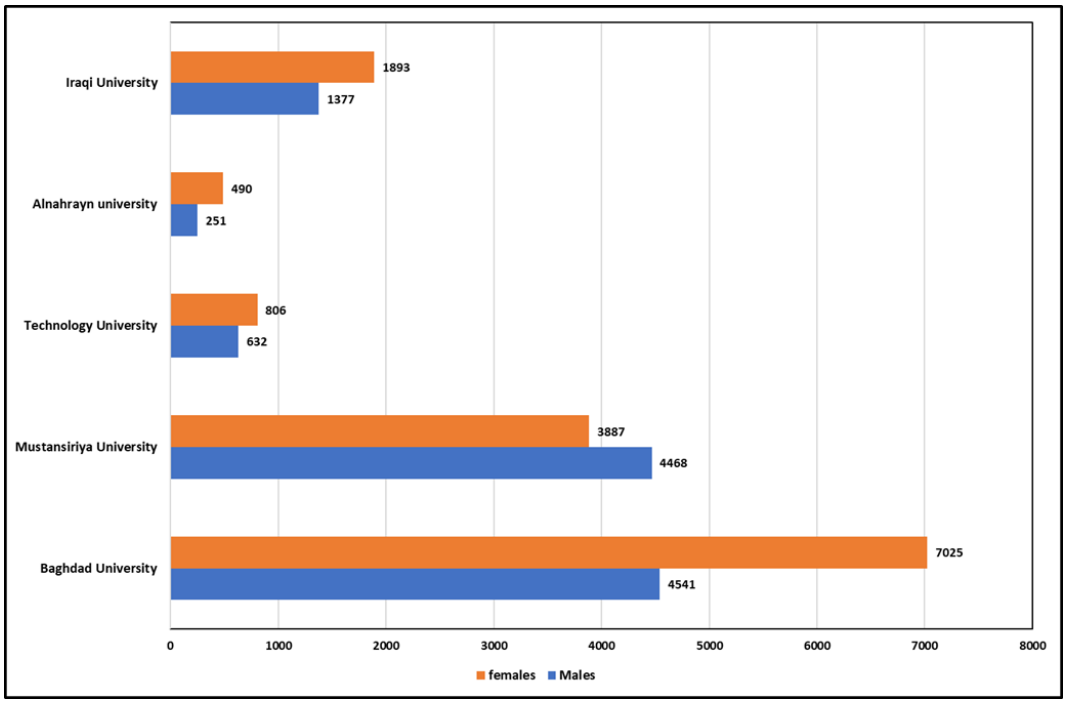


Figure 5: Distribution of the number of graduates of public universities (morning and evening) in Baghdad Governorate for the academic year 2016/2017

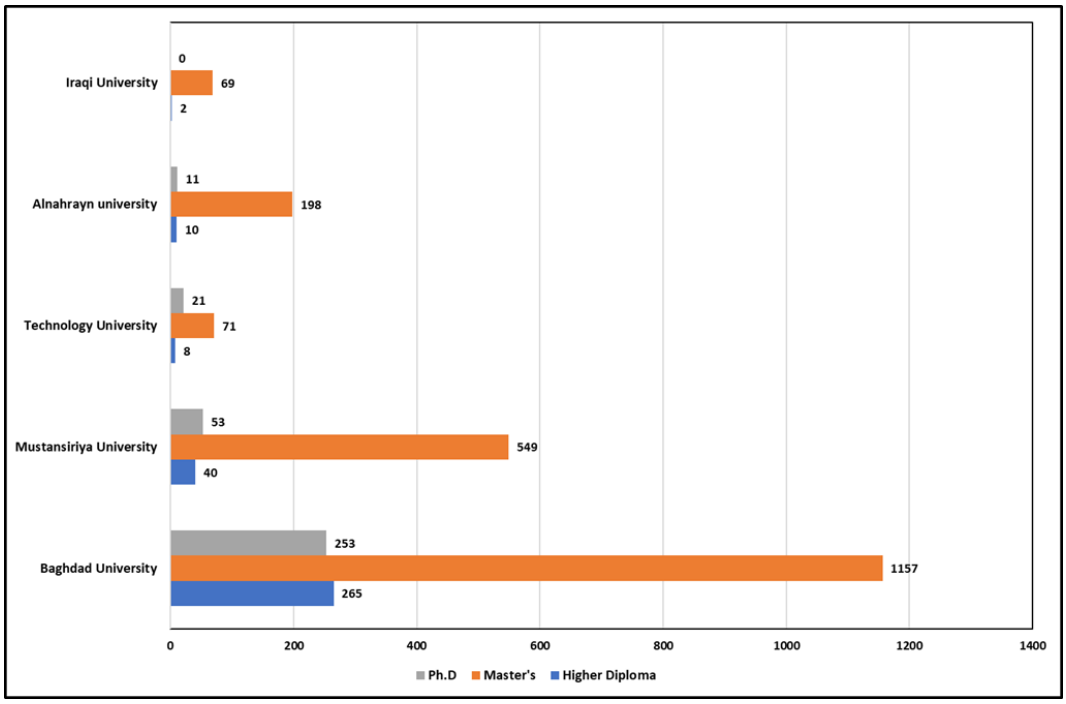


Figure 6: Percentage distribution of postgraduate graduates from universities in Baghdad governorate for the study year 2016-2017

The analysis reveals a disparity in the educational services provided in the research area, particularly concerning the ratio of teachers (both male and female) to the number of students. This disparity is more evident in administrative units with high population density. The deficit is observed in terms of the number of schools and classrooms compared to the number of enrolled students. Additionally, the quality of the learning environment is compromised, which is an essential factor in determining the quality of education. Moreover, schools face challenges due to the insufficient supply of electricity, which restricts the use of modern teaching technologies. Rural areas experience a significant decline in the quality of education. Poorly maintained and unpaved roads leading to these areas make the journey to school burdensome for students. Furthermore, there is a limited number of schools available in villages, exacerbating the challenges faced in accessing quality education in rural areas.

4.1.2. Health Services

Over the past three decades, Baghdad, along with other governorates in Iraq, has experienced a decline in the quality of healthcare services. This has led citizens, particularly those with limited income, to rely on hospitals and private healthcare

institutions, imposing a burden on the people of Baghdad. Several indicators highlight the challenges and problems faced by the healthcare sector in Baghdad. One of the major issues is the significant shortage of healthcare services, both in terms of quantity and quality.

This shortage is evident in hospitals and health centers alike, as they often lack proper planning and fail to keep up with the growing population. The infant mortality rate is also alarmingly high, with 22.5 deaths per thousand births recorded in 2016. Moreover, there is a shortage of infrastructure services in healthcare institutions, including electricity, sanitation, communication, and water supply. Waste management and disposal are not adequately addressed, contributing to unsanitary conditions.

Another challenge lies in the delayed implementation of health investment projects, such as public hospitals, specialized medical centers, and other healthcare facilities. Most healthcare institutions lack modern and advanced medical equipment, which hinders efficient diagnosis and treatment of patients. The lack of essential resources and equipment further adds to the strained healthcare system. Additionally, the poor state of health extends beyond healthcare facilities.

The country, including the research area, faces challenges related to the availability and quality of pharmaceutical and food commodities, locally produced goods, and environmental issues. Disease outbreaks are more prevalent due to these factors, coupled with inadequate health procedures at airports, hotels, restaurants, and food production factories. The aging infrastructure of hospitals is another concern, as most facilities were established between 1970 and 1980 and are not in line with modern healthcare standards.

The capacity of these hospitals falls short in meeting the increasing demands of the population. Lastly, there is a lack of oversight by the Ministry of Health regarding private hospitals, leading to potential exploitation of citizens by some private healthcare providers. (Baghdad Governorate Planning Directorate, 2013, p. 137).

4.1.2.1. Hospitals

The province of Baghdad is home to a total of 94 hospitals, with 48 being governmental hospitals and 46 being private hospitals (Table 8). Most of these hospitals,

53 in total, are located in the Rusafa district. Following that, Al-Karkh district has 19 hospitals, Adhamiya district has 7 hospitals, Al-Kadhimiya district has 5 hospitals, and both Al-Sadr Al-Thaniah and Al-Madain districts have 3 hospitals each. The districts with the fewest hospitals are Al-Sadr Al-Oula, Al-Mahmudiya, Abu Ghraib, and Tarmiyah, each having only one hospital. A map can provide a visual representation of the distribution of these hospitals. It's worth noting that one reason for the relatively higher number of hospitals in the Rusafa district is due to the inclusion of hospitals affiliated with the Medical City Department in the Bab al-Muadham area, which fall within the boundaries of this district.

In the governmental hospitals of Baghdad, there is a distribution between general hospitals and specialized hospitals. In the Rusafa district, there are 20 specialized hospitals. Eight of these hospitals are located in the eastern Karrada district and cover specialties such as children's healthcare, heart and chest surgery, ophthalmology, childbirth, psychiatry, infertility and in-vitro fertilization (IVF), reconstructive surgery, and oncology.

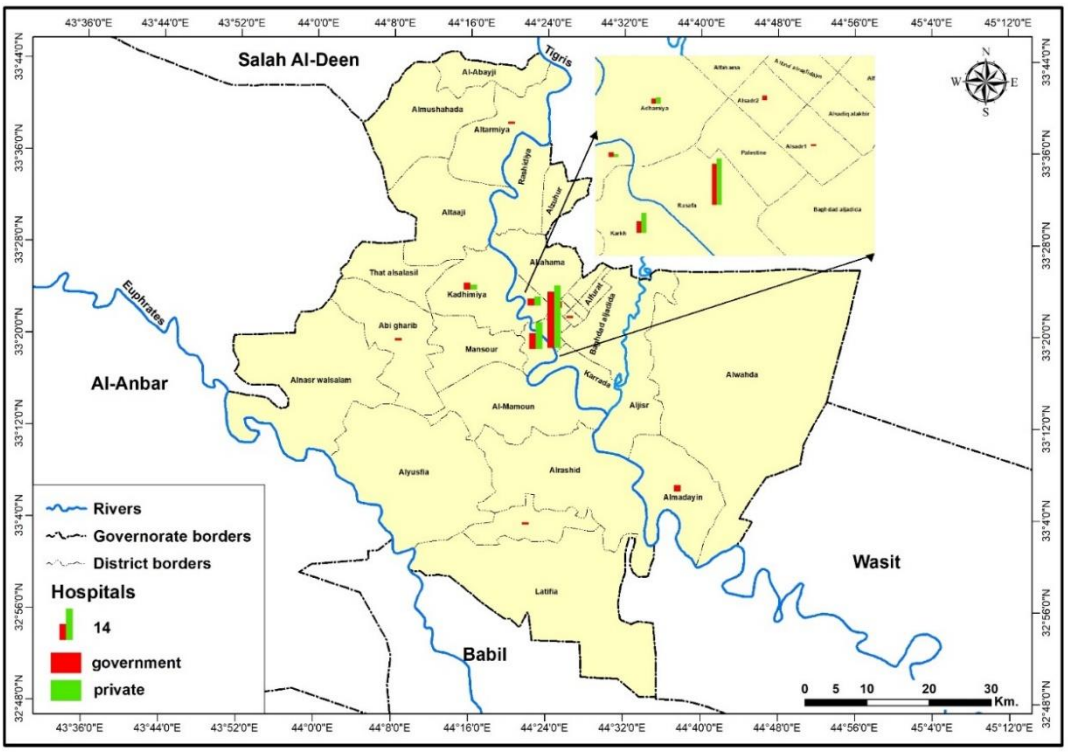
There is also a psychiatric hospital in the Al-Shamaya area, a neurosurgery hospital in the Al-Saadoun area, a spinal cord injury hospital in the New Baghdad district, and a tumor hospital in Al-Qanat. Furthermore, in the Bab Al-Mu'azzam area, there are eight specialized hospitals in various fields including specialized surgeries, pediatrics, digestive diseases, burns, tumors, heart diseases, kidney transplants, and bone marrow transplants. In the Karkh district, there are three specialized hospitals. Two of them are located in the Nahiyat Center of Karkh district, specializing in obstetrics and heart surgery, while the third hospital in the Al-Mansour district specializes in children's healthcare.

In Adhamiya district, there is one hospital specializing in nervous diseases located in the Al-Rashidiyah district. The first chest and second chest districts have two specialized hospitals located in the Women's and Children's centers. In the Al-Madaen district, there is one specialized hospital in the Jisr Diyala area specializing in chest diseases. Finally, in the Al-Kadhimiya district, there is one specialized hospital in the district center specializing in children's healthcare. On the other hand, the districts of Al-Mahmudiyah, Abu Ghraib, and Tarmiyah lack specialized hospitals.

Table 12: Governmental and private hospitals and the percentage of disability in the districts of Baghdad Governorate for the year (2022)

Name	Hospitals		
	Governmental hospitals	private hospitals	deficit and surplus hospitals
Rusafa	25	28	17
Adhamiya	3	4	17-
chest/1	1	0	13-
chest/2	3	0	7-
Cities	3	0	6-
Karkh	7	12	13-
Kadhimiya	3	2	13-
Mahmudiyah	1	0	9-
Abu Ghraib	1	0	5-
Altarmiya	1	0	2-
the total	48	46	69-

Source: Ministry of Health, Department of Planning and Resources Development, Department of Health and Life Statistics, Health Institutions Guide, 2022, pp. 10-52.



Map 11: Variation in the numbers of hospitals (governmental and private) among the districts of Baghdad Governorate for the year (2022)

Source: From the work of the researcher, relying on the Ministry of Water Resources, the General Commission for Survey, the Division of Map Production, the administrative map of Baghdad Governorate, at a scale of 1:250,000, for the year 2020. Source No. 2 is added with it: it is the number of the table that was relied upon in mapping

According to the mentioned planning criterion of one hospital for every 50 thousand people, it is observed that Al-Rusafa District in Baghdad has a surplus of hospitals with 17 hospitals more than the ideal number based on the population size. (Directorate of Planning of Baghdad Governorate, 2013, p. 389). On the other hand, all the other districts in the study area show a deficit in the number of hospitals to varying degrees. The deficit is the highest in Adhamiya District with a shortage of 17 hospitals, followed by 13 hospitals in Al-Mahmudiyah district, 9 hospitals in Second Al-Sadr district, 6 hospitals in Al-Madaen district, 5 hospitals in Abu Ghraib district, and 2 hospitals in Al-Tarmiyah district. These figures indicate the imbalance between the number of hospitals and the population distribution in the respective districts.

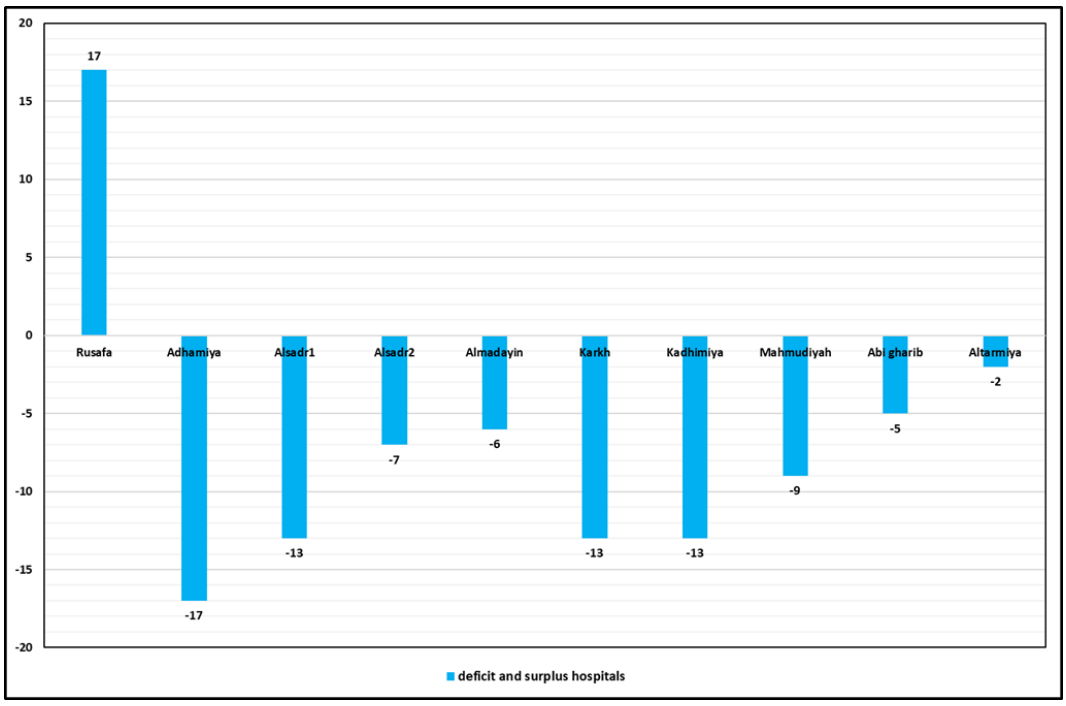


Figure 7: Deficit and surplus in the number of hospitals among the districts of Baghdad Governorate for the year 2022

4.1.2.2. Health centers

Table (9) deals with the group of health centers in the study area and its two parts namelyprimary health care centers and specialized health centres. There are a total of 291 health centers in Baghdad governorate, including 254 primary health care centers and 37 specialized health centers. The distribution of these centers is as follows: 66 centers in Karkh district, 61 centers in Rusafa district, 43 centers in Adhamiya district, 29 centers in Kadhimiya district, 24 centers in Al-Mahmudiyah district, 18 centers in Al-Madaen district, 14 centers each in Al-Sadr Al-First, Al-Sadr Al-Second, and Abu Ghraib districts, and 8 centers in Al-Tarmiyah district. These health centers play a crucial role in providing primary healthcare services and specialized medical care to the residents of each district.

In Rusafa district, there are 15 specialized health centers located in different areas. Three centers are situated in the district center, two specializing in dental care and two in rehabilitation for the disabled. Two centers are located in Al-Zafaraniya and Zayouna regions, specializing in rehabilitation for the disabled. In the Al-Qanat area, there are two centers specializing in prosthetic limbs and medical supports. Additionally, there is a dental center in the al-Baladiyat area. The remaining six centers in Rusafa district are located in the Bab Al-Moazem area, offering specialized services such as hearing and speech therapy, toxicology consultations, Pasteur Institute services, radiation and nuclear medicine, radiology training, and dermatology and syphilis treatment. In Karkh district, there are nine specialized health centers. Three of them are in the district center, with two focusing on dental care and one on allergy and asthma.

The remaining six centers are in Al-Mansour district, with three specialized in dentistry, two in rehabilitation for the disabled, and one in chest and respiratory diseases. Adhamiya district has five specialized health centers. Two centers are located in Nahiya Markaz district, one specializing in dental care and the other in dental industry and orthodontics. There is one center in Al-Rashidiyah district specializing in medical rehabilitation and joint diseases, and two dental centers in Al-Shaab and Al-Hussainiya areas. Al-Kadhimiya district has three specialized health centers, all focused on dental care. Two centers are in Markaz sub-district, and one is in That Al-Salasil sub-district. The Second Al-Sadr District has three centers, two specializing in dental care and one in rehabilitation for the disabled. In Al-Sadr First District, there are two centers in the

Canal Center area, one specializing in dental care and the other in sensitivity. The districts of Al-Madaen, Al-Mahmudiyah, Abu Ghraib, and Al-Tarmiyah do not have specialized health centers.

Similar to hospitals, the amount of deficit in preparing health centers for each district was also calculated, based on a planning criterion that assumes the necessity of having one health center for every 5 thousand people (Baghdad Governorate Planning Directorate, 2013, p. 402)., As shown in the table (4-46) it was observed that the Baghdad governorate in general, according to the aforementioned standard, recorded a deficit in the number of health centers amounting to (1334) health centers, and in detail at the district level, it was noted that all of them recorded a deficit as well.

The districts with the highest deficit in specialized health centers, listed from the highest to the lowest, are as follows: Al-Rusafa, Karkh, Adhamiya, Al-Kadhimiya, Al-Sadr Al-First, Al-Sadr Al-Second, Al-Madaen, Al-Mahmudiyah, Abu Ghraib, and Al-Tarmiyah. The number of centers they are lacking are as follows: Al-Rusafa (301), Karkh (253), Adhamiya (197), Al-Kadhimiya (150), Al-Sadr Al-First (128), Al-Sadr Al-Second (87), Al-Madaen (74), Al-Mahmudiyah (73), Abu Ghraib (51), and Al-Tarmiyah (21)

Table 13: Primary and specialized health centers in the districts of Baghdad Governorate for the year (2022)

Eliminate	**Health centers**					
	Primary health care centers	Specialized health centers	Total health centers	The ideal number of health centers according to the local planning standard (one health centerforevery5,000 people)	The amount of deficit in the number of health centers	The current situation (Nasma / health center)
Rusafa	46	15	61	362	301-	29,663
Adhamiya	38	5	43	240	197-	27,965
chest/1	12	2	14	142	128-	50,599
chest/2	11	3	14	101	87-	35,962

Cities	18	0	18	92	74-	25,537
Karkh	57	9	66	319	253-	24,147
Kadhimiya	26	3	29	179	150-	30,945
Mahmudiyah	24	0	24	97	73-	20,167
Abu Ghraib	14	0	14	65	51-	23,076
Altarmiya	8	0	8	29	21-	18,141
the total	254	37	291	1625	1334-	27,927

Source: Iraqi Ministry of Health and Environment, Department of Planning and Resources Development, Department of Health and Life Statistics, Health Institutions Guide, 2022, pp. 10-52.

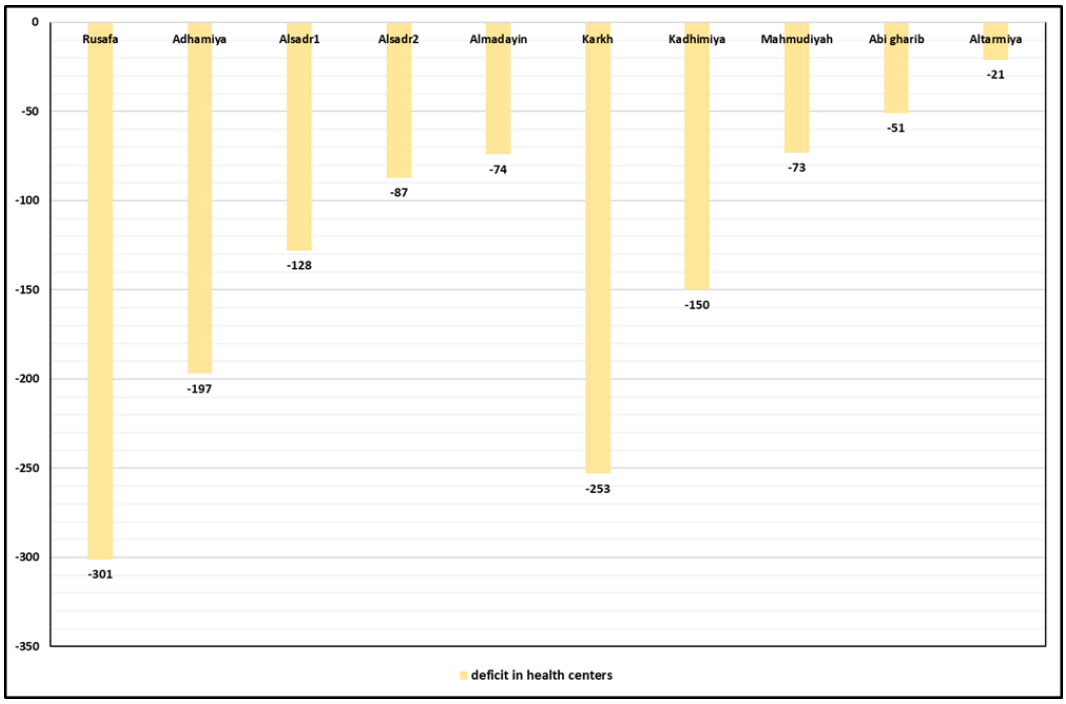


Figure 8: Variation in the amount of disability in the number of health centers among the districts of Baghdad Governorate

4.1.2.3. Medical Clinics

As shown in Table 10, the total number of popular medical clinics in Baghdad governorate is 63, distributed as follows: 22 clinics in Karkh district, 13 clinics in Rusafa district, 9 clinics in Al-Kadhimiya district, 8 clinics in Adhamiya district, 6 clinics in Al-Sadr first district, 3 clinics in Second Al-Sadr district, and one clinic each in Al-

Mahmudiyah and Abu Ghraib districts. Additionally, there are 8 clinics in Al-Tarmiyah district. However, both Al-Madaen and Al-Tarmiyah districts do not have any popular medical clinics. When applying the planning criterion of having one popular medical clinic for every 10,000 people, it is evident that Baghdad governorate faces a significant deficit in the number of popular medical clinics. The total deficit amounts to 750 clinics, and it is distributed across the districts as follows (from highest to lowest deficit): Al-Rusafa, Karkh, Adhamiya, Al-Kadhimiya, Al-Sadr Al-First, Al-Sadr Al-Second, Al-Mahmudiyah, Al-Madain, Abu Ghraib, and Al-Tarmiyah. The deficit for each district is as follows: 168 clinics for Al-Rusafa, 137 clinics for Karkh, 112 clinics for Adhamiya, 81 clinics for Al-Kadhimiya, 65 clinics for Al-Sadr Al-First, 47 clinics for Al-Sadr Al-Second, 47 clinics for Al-Mahmudiyah, 46 clinics for Al-Madain, 31 clinics for Abu Ghraib, and 15 clinics for Al-Tarmiyah. Please refer to the provided table for visual representation.

Table 14: popular medical clinics that actually exist and are required in the districts of Baghdad Governorate for the year (2022)

Eliminate	**popular medical clinics**		
	Popular medical clinics that actually exist	The ideal number of public nature clinics according to planning and local standards (one clinic per 10,000 people)	The amount of deficit in the number of popular medical clinics
Rusafa	13	181	168-
Adhamiya	8	120	112-
chest/1	6	71	65-
chest/2	3	50	47-
Cities	0	46	46-
Karkh	22	159	137-
Kadhimiya	9	90	81-
Mahmudiyah	1	48	47-
Abu Ghraib	1	32	31-
Altarmiya	0	15	15-
the total	63	813	750-

Source: Iraqi Ministry of Health and Environment, Department of Planning and Resources Development, Department of Statistics, Health and Life, Health Institutions Guide, 2018, pp. 10-52.

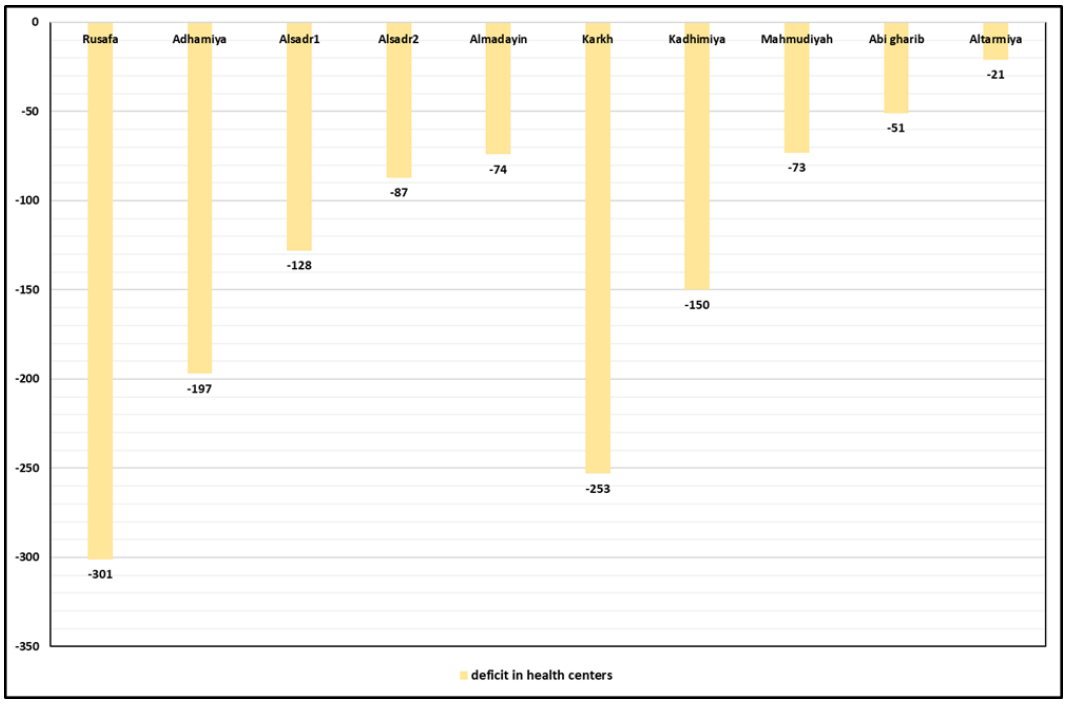


Figure 9: Variation in the amount of deficit in the number of popular medical clinics among the districts of Baghdad Governorate

4.1.2.4. Other Health Services

The table provided presents the capabilities of districts in Baghdad governorate in terms of different healthcare facilities, including immediate aid centers, health homes, birth and death registration offices, nursing and midwifery institutes and preparatory schools, and mobile medical clinics. The distribution of healthcare facilities in the districts of Baghdad governorate is as follows: There are (23) centers in Rusafa district, (22) centers in Karkh district, (10) centers in Adhamiya district, (7) centers in Kadhimiya district, and (5) centers in Madaen district. In the Second Sadr District, there are (4) cities, while the First Sadr District has (3) centers. Al-Mahmudiya District has (2) centers, and Abu Ghraib and Tarmiya districts each have (1) center. Regarding health homes, the total number in Baghdad governorate is (43) homes, distributed among six districts as follows: Al-Madaen has (20) homes, Karkh has (8) homes, Al-Kadhimiya has (7) homes, Abu Ghraib has (4) homes, Al-Mahmudiya has (3) homes, and Al-Adhamiya has (1) home.

Regarding birth and death registration offices, the total number in Baghdad governorate is (29) centers. They are distributed across districts in the following order from highest to lowest: Al-Rusafa (6), Karkh (5), Al-Madain (4), Al-Kadhimiya (4), Al-

Mahmudiya (3), Al-Adhamiya (2), Abu Ghraib (2), First Sadr (1), Second Sadr (1), and Al-Tarmiyah (1). In terms of nursing and midwifery preparatory institutes, the total number in Baghdad governorate is (15). They are distributed as follows: Rusafa district has (5) institutes, while the First Sadr, Karkh, Kadhimiya, and Mahmudiyah districts each have (2) institutes. The Madaen and Abu Ghraib districts have (1) institute each. However, the Second Sadr and Tarmiyah districts do not have any institutes or preparations for nursing and midwifery. Lastly, there are (14) mobile medical clinics in Baghdad governorate. They are distributed as follows: Karkh district has (3) clinics, while Rusafa, Adhamiya, Al-Madaen, and Al-Kadhimiya districts each have (2) clinics. The First Sadr, Al-Mahmudiya, and Abu Ghraib districts have (1) clinic each. However, the Second Sadr and Al-Tarmiyah districts do not have any mobile medical clinics.

Table 15: Other health services in the districts of Baghdad Governorate for the year (2022)

Eliminate	Other health services				
	Immediate aid centers	healthy homes	Birth and death registration offices	Institutes and preparatory nursing and midwifery	Mobile medical clinics
Rusafa	23	0	6	5	2
Adhamiya	10	1	2	0	2
chest/1	3	0	1	2	1
chest/2	4	0	1	0	0
Cities	5	20	4	1	2
Karkh	22	8	5	2	3
Kadhimiya	7	7	4	2	2
Mahmudiyah	2	3	3	2	1
Abu Ghraib	1	4	2	1	1
Altarmiya	1	0	1	0	0
the total	78	43	29	15	14

Source: Iraqi Ministry of Health and Environment, Department of Planning and Resources Development, Department of Health and Life Statistics, Health Institutions Guide, 2022, pp. 10-52.

4.1.2.5. Number of Beds

The number of beds prepared for admission in the health institutions of the Baghdad governorate in general reached (10,242) beds, and it is clear in the table ( ) that they have varied in numbers between the different districts of Baghdad governorate. The districts of Baghdad governorate, listed in order from highest to lowest, have the following number of beds: Rusafa (5,268), Karkh (1,935), Kadhimiya (924), Second Sadr (557), First Sadr (554), Adhamiya (494), Madaen (251), Abu Ghraib (137), Mahmudiyah (88), and Tarmiyah (34).

Table 16: Characteristics of the hospitals in the districts of Baghdad governorate for the year (2022

	the beds			
	The number of beds prepared for sleeping	The number of beds equipped for ideal sleep according to the local planning standard (one bed per 500 inhabitants)	The amount of the deficit in the number of beds	current reality (ratio/bed
Rusafa	5268	3619	1649	343
Adhamiya	494	2405	1911-	2,434
chest/1	554	1417	863-	1,279
chest/2	557	1007	450-	904
Cities	251	919	668-	1,831
Karkh	1935	3187	1252-	824
Kadhimiya	924	1795	871-	971
Mahmudiyah	88	968	880-	5,500
Abu Ghraib	137	646	509-	2,358
Altarmiya	34	290	256-	4,269
the total	10242	16254	6012-	793

Source: Sabiha Majeed Shiaa and Ghasun Yusuf Ali, Distribution of health institutions in Iraq and bed occupancy rates for the year 2022, Iraqi Ministry of Health and Environment, Department of Health and Life Statistics, pp. 21, 23, 25.

When applying the criterion of having one bed for every 500 people, the overall deficit in the number of beds in Baghdad governorate is 6,012 bedsDirectorate, 2013, p. 405 Among the districts, only Rusafa district has an excess of 1,649 beds, while the rest of the districts experience a shortage. The districts with the highest to lowest deficits are

Adhamiya, Karkh, Kadhimiya, Mahmoudiya, Al-Sadr Al-Awwal, Al-Madain, Abu Ghraib, Al-Sadr Al-Second, and Al-Tarmiyah, with deficits of 1,911, 925, 880, 871, 863, 668, 509, 450, and 456 beds, respectively. The distribution is illustrated in the provided shape.

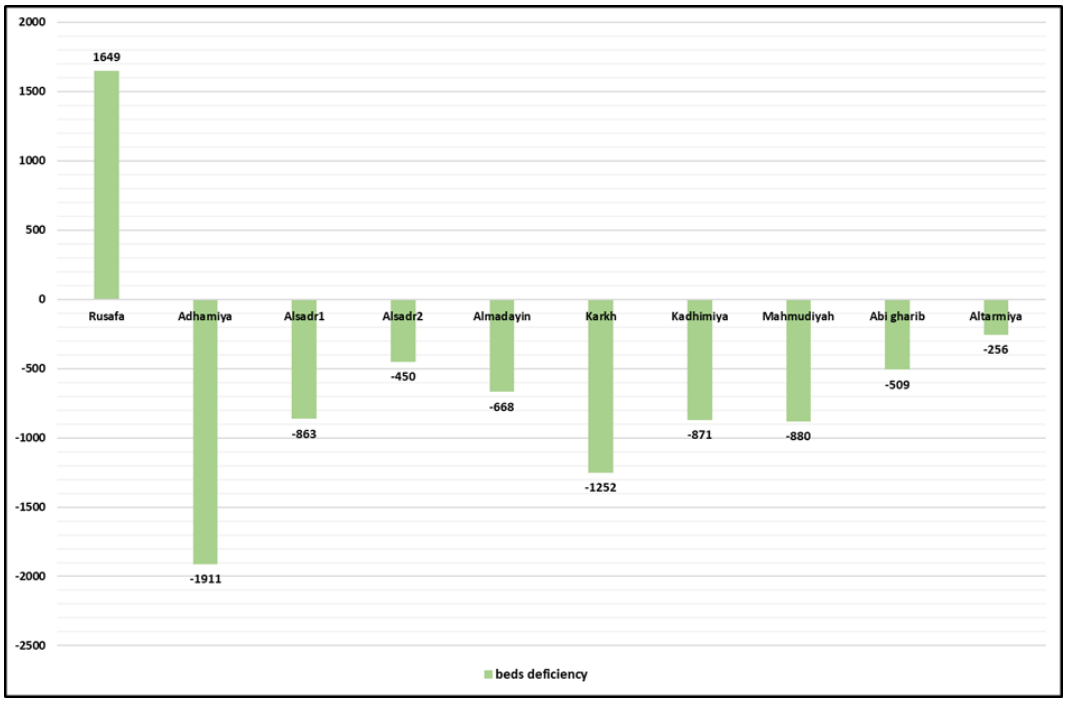


Figure 10: Variation in the amount of deficit and surplus in the number of beds between the districts of Baghdad Governorate

4.1.2.6. Number of Doctors

The provided table indicates that the total number of physicians in Baghdad governorate is 13,526. Among them, there are 3,353 specialized physicians, 5,131 non-specialist physicians, and 5,042 dentists. The distribution of physicians varies across districts. From highest to lowest, the districts with the highest number of physicians are Al-Rusafa, Karkh, Al-Kadhimiya, Al-Adhamiya, Al-Sadr Al-First, Al-Sadr Al-Second, Al-Mahmudiyah, Abu Ghraib, Al-Madain, and Al-Tarmiyah. The respective number of doctors in these districts is 3,972, 3,514, 1,762, 1,403, 835, 561, 554, 451, 347, and 127.

Table 17: The number of doctors in the districts of Baghdad Governorate for the year (2022)

Eliminate	the doctors						
	Specialty doctor	Non-professional doctor	dentist	total doctors	The ideal number of doctors according to the local planning standard (one doctor per thousand inhabitants)	The amount of shortage in the number of doctors	The current reality is Nesma/Doctor
Rusafa	1263	1504	1205	3972	1809	2163	456
Adhamiya	193	473	737	1403	1202	201	857
chest/1	174	353	308	835	708	127	848
chest/2	125	290	146	561	503	58	897
Cities	34	148	165	347	460	113-	1325
Karkh	999	1249	1266	3514	1594	1920	454
Kadhimiya	401	716	645	1762	897	865	509
Mahmudiyah	72	193	289	554	484	70	874
Abu Ghraib	70	176	205	451	323	128	716
Altarmiya	22	29	76	127	145	18-	1143
the total	3353	5131	5042	13526	8127	5399	601

Source: Iraqi Ministry of Health and Environment, Planning and Resources Development Department, Health and Life Statistics Department, Data Mechanization Division, unpublished data, 2022.

When applying the planning criterion, which states the need for one doctor per thousand people, the surplus and deficit in the numbers of doctors were calculated. The districts with a surplus of doctors, from highest to lowest, are Al-Rusafa, Karkh, Kadhimiya, Adhamiya, Abu Ghraib, Al-Sadr Al-First, Al-Mahmudiyah, and Al-Sadr Al-Second. The respective surplus of doctors in these districts is 2,163, 1,920, 865, 201, 128, 127, 70, and 58 doctors. On the other hand, the districts of Al-Madaen and Al-Tarmiyah face a deficit in the number of doctors, with 133 and 18 doctors respectively. This indicates an imbalance in the distribution of doctors across the districts of Baghdad governorate, highlighting one of the problems in the health sector.

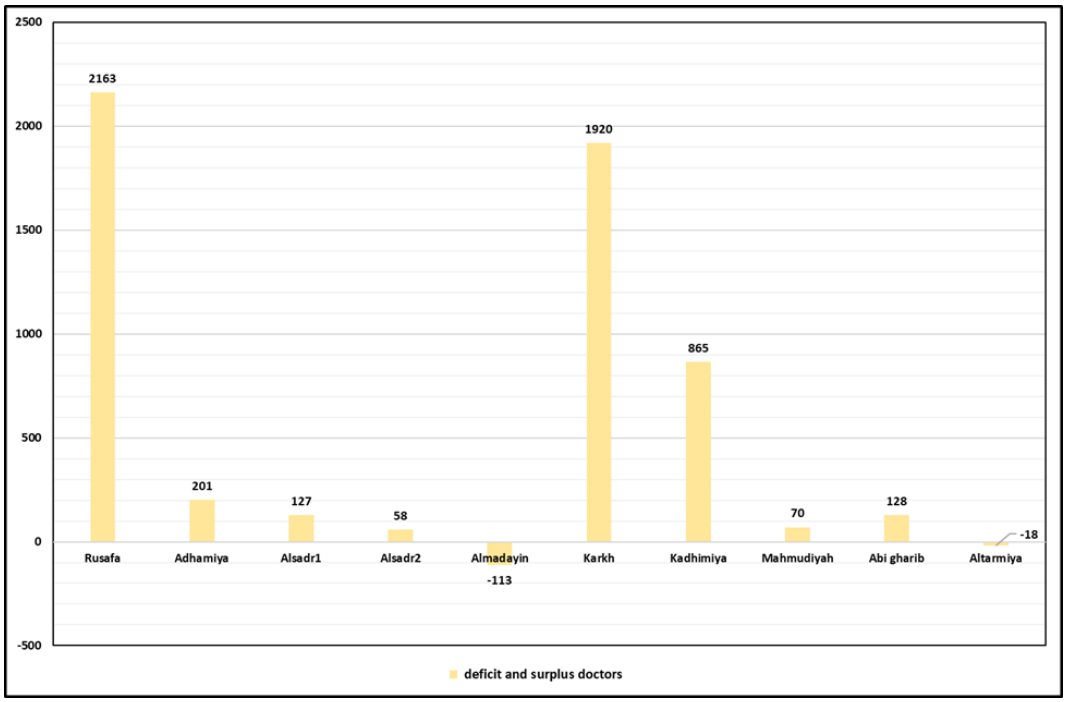


Figure 11: Deficit and surplus doctors

4.1.2.7. Other Medical and Health Staffs:

Table 12 reviews the numbers of medical and health staffs (pharmacists, technical and laboratory health staffs, and nursing staffs), and with regard to (pharmacists), their total amounted is (4649) pharmacists throughout Baghdad governorate, and the largest number of them was concentrated in the districts of (Rusafa and Karkh) with (1603, 1090) pharmacists, while (Al-Tarmiyah district) recorded the least number of (79) pharmacists only.

Table 18: Number of (medical and other health staff) in the districts of Baghdad Governorate for the year (2022)

Eliminate	Other medical and health staff		
	Pharmacist	Technical and laboratory health staff	Nursing staff
Rusafa	1603	8089	5111
Adhamiya	376	2068	728
chest/1	236	1617	831
chest/2	181	868	714
Cities	138	623	562
Karkh	1090	5423	1918

Kadhimiya	532	3123	1175
Mahmudiyah	205	1113	394
Abu Ghraib	209	736	286
Altarmiya	79	392	137
the total	4649	24052	11856

Source: Iraqi Ministry of Health and Environment, Department of Planning and Resources Development, Department of Health and Life Statistics, Data Mechanization Division, unpublished data, 2022.

The total number of technical and laboratory health personnel in Baghdad governorate is 24,052, with the following distribution in the districts: 8,089 in Al-Rusafa, 5,423 in Karkh, 3,123 in Kadhimiya, 2,068 in Adhamiya, 1,617 in Abu Ghraib, 1,113 in Al-Sadr Al-First, 868 in Al-Mahmudiyah, 736 in Al-Sadr Al-Second, 623 in Al-Madaen, and 392 in Al-Tarmiyah. Regarding the nursing staff, the total number is 11,856 in the entire province of Baghdad. At the district level, the order from highest to lowest is as follows: Al-Rusafa, Karkh, Kadhimiya, Al-Sadr Al-First, Adhamiya, Al-Sadr Al-Second, Al-Madaen, Al-Mahmudiyah, Abu Ghraib, and Al-Tarmiyah. The respective numbers of nursing staff in these districts are 5,111, 1,918, 1,175, 831, 728, 714, 562, 394, 286, and 137. This provides an overview of the distribution of technical and laboratory health personnel as well as nursing staff across the districts of Baghdad governorate.

4.1.3. Transportation Services

The transportation system in the city consists of two basic elements, which are the street network, the internal roads and the means of transport used. An analysis of these two elements is made as follows.

4.1.3.1. The development of the internal street network

Before discussing the development of road networks, it is important to clarify some concepts related to this subject. The term "roads" can have different meanings depending on the context. In a narrow sense, it refers to lanes or pathways of local or limited significance. However, in a broader sense, it encompasses all types of routes on land that facilitate the movement of people and goods. On the other hand, the term "street" specifically refers to roads that are situated within the boundaries of

municipalities and cities. [143]Traffic term refers to the movement of types of vehicles, people, goods, and even messages [144]

In Iraq, streets are described functionally and technically into four categories.

- The main roads of national and international importance, linking cities to the national road network are 50-100 m wide
- The main roads are the roads that connect the sectors of the city with each other, with 40-70 m width.
- The public secondary roads are the roads within the city sectors with 20-40m width.
- The local roads are the main roads of the crossings that are 10-20 m wide.

The road network within a city forms a complex system of interconnected pathways, creating a sense of interdependence among different parts of the city and between the city itself and the surrounding human settlements. This network holds significant economic, social, and political importance. In the case of Baghdad, the city grew organically over time without proper pre-planning for its internal streets until the 1950s. The traditional areas of the city, known as Rusafa and Karkh, still retain their organic layout with narrow alleys and winding paths. The first lane, Al-Mustansir Street, was opened in the center of Rusafa in 1910, marking the initial step towards establishing modern streets. One notable example is Al-Rashid Street, which was established in the same center in 1910. Subsequently, Al-Kifah, Sheikh Omar, and Al-Jumhuriya Streets were opened in the mid-20th century. These streets on the Rusafa side run parallel between two squares: Bab Al-Mu'adham in the north and Tahrir Square in the south. Another significant street, Musa Al-Kadhim Street, connected the center of Al-Karkh to the suburb of Al-Kadhimiya. This longitudinal plan for the streets shaped the city's layout during that period. It is important to note that this historical development of the road network in Baghdad highlights the evolution of the city's infrastructure and the gradual transition from traditional organic layouts to a more structured urban design.Since the fifties, and with the increase in the city’s population, the state has

[143] Encyclopedia Britannica,vol.19,p.367.
[144] Encyclopedia Britannica,vol.22,p.153.

contracted with some foreign institutions to develop basic plans to direct the growth of the city, namely the Doxiades and Paul Service institutions.

In the 1980s, Baghdad entered a contract with a Japanese company and transportation consultants with the aim of enhancing the city's transportation and traffic network. As per these plans, numerous main, secondary, and local streets were constructed, along with the establishment of back roads. This development led to a significant transformation in the city's layout, as Baghdad began to expand in a semi-circular and radial pattern. The estimated length of the free and express streets, as well as the proposed back roads, in the city of Baghdad is 372 km. These roads are designed to provide efficient and fast transportation routes within the city. Until 2013, the percentage of completed roads within this network was 57.5%. Additionally, the length of the network of main, secondary, and local streets in the city is estimated to be 33.7 km. Among these streets, 77.8% are categorized as local streets, while 12.2% are considered main streets. The remaining percentage corresponds to secondary streets.

According to these data, 1 km of road serves 1,667 residents of the city, and 1 km 2 of the built-up area of the city is 19% of the total area in 2012.These indicators show the extent of the deficit in this network, which is not compatible with the size of the city and its area, which is reflected in the traffic momentum and the weakness of movement in it. **(145)**

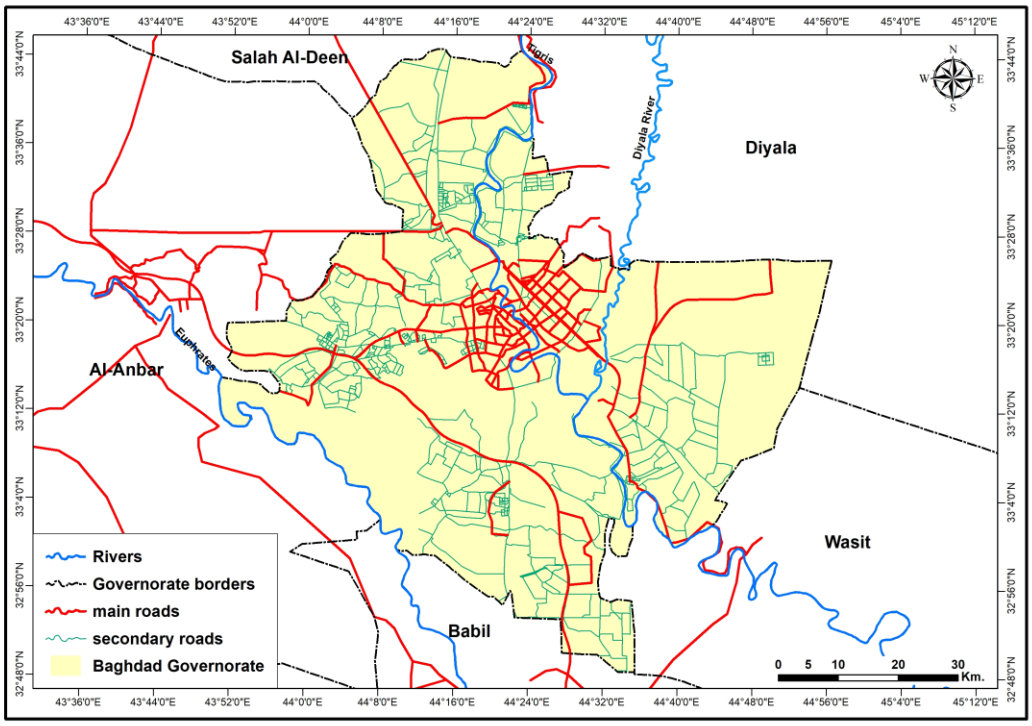
Table 19: The length of the street network / km in the city in 2012

Free and fast streets implemented	main streets	secondary streets	local streets	the total
214	404,3	428,7	2574	3521

(146)

[145] Baghdad Municipality, Basic Design Department, Transportation Development Pamphlet, p. 6.

[146] Baghdad Municipality, Department of Designs, Division of Transportation and Traffic Planning, unpublished data, 2012



Map 12: The network of internal streets in the city of Baghdad 2013, Source: Baghdad Municipality, GIS Division

In response to the increasing transportation and traffic challenges in the city, the government initiated the construction of several bridges for both vehicular and pedestrian traffic starting from 2008. The total number of vehicle bridges constructed was six, with three located on the Rusafa side of Baghdad and the remaining three on the Karkh side. By September 2014, four of these bridges had been completed and were operational. Furthermore, the city also witnessed the construction of 60 pedestrian bridges. These bridges were distributed across 12 municipal units within Baghdad, aiming to improve pedestrian mobility and safety. The municipalities of Mansour, Al-Rasheed, Al-Rusafa, and Al-Ghadeer had the highest percentages of pedestrian bridges, ranging from 21.7% to 13.3% in terms of distribution and coverage. **(147)** These measures were taken in order to achieve an acceptable flow of vehicle traffic. However, it seems that the problem of movement still exists from field observations in the city.

147 Baghdad Municipality, GIS Division, 2013

4.1.3.2. Transportation and traffic problems in the city

Increase in the number of vehicles: Vehicles are of various types and capacities. The primary modes of transportation in the city of Baghdad include private vehicles and taxis, typically with a capacity of four passengers. These vehicles commonly include models such as Kia and Coaster. Additionally, there is the movement of cargo vehicles with a carrying capacity of around 2 tons for the transportation of goods. In terms of individual transportation, motorcycles, bicycles, and scooters are also prevalent in the city. Some streets may also witness the presence of open carts pulled by horses, as observed on Safi Al-Din Al-Hali Street. These carts are typically used by residents of Sadr City to travel to different neighborhoods within the city for purchasing household items.

The city of Baghdad has experienced a significant increase in its population and economic activities, leading to various factors that have contributed to the growth of vehicle numbers. These factors include an improvement in the standard of living, changes in land use, and an increase in the availability of vehicles. The registered number of vehicles in Baghdad rose from 992,000 vehicles in 2008 to 1.2 million vehicles in 2012. This indicates a continuous growth in the vehicle population over the years. Furthermore, the ratio of persons to vehicles stood at 5.1 persons per vehicle in 2008 and decreased to 4.9 persons per vehicle in 2012. The rising number of vehicles and their increased usage have resulted in significant traffic congestion on the streets and roads of the city.[148)]

Table 20: The number of vehicles and motorcycles registered in Baghdad 2008-2012

year	bicycles	vehicles	private cars	taxis	auto load	auto check temporary
2008	21	992	34,4	8,3	10,2	47,1
2012	21,3	1200	28,8	9,5	8,3	52,4

Baghdad Municipality, Department of Designs, previous source.[148]

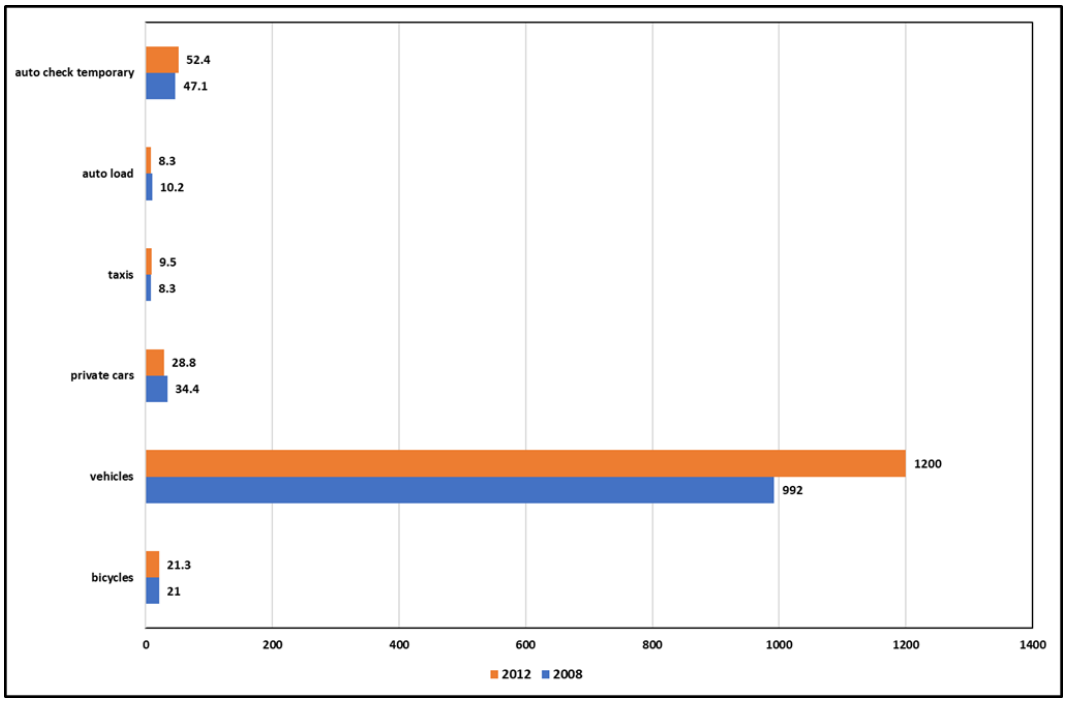


Figure 12: the number of vehicles and motorcycles registered in Baghdad 2008-2012

The problem of scooters: This problem arose in the city after 2003 as a result of facilitating the movement of imports of goods and commodities from various origins. This method is used to transport people and goods as well. Its use expanded in the streets of the city until 2007, and due to the difficult security conditions and accidents of explosions, the movement of these motorcycles was prevented in most of the main streets. The use of some of them in Al-Jumhuriya Commercial Street, which is defined as the Scooter for transporting people, as well as the movement of this means in the various streets of residential neighborhoods in the city.

The number of bikes registered in Baghdad governorate reached 21,000 in 2008, bringing the number to 21.3 thousand in 2013, and large numbers of these bikes are displayed in many streets for sale, table (). This leads to an exacerbation of the traffic problem, especially in the absence of satisfactory measures to isolate the movement of this means of movement from the movement of vehicles, and the possibility of an increase in the frequency of accidents as well. In some streets on the outskirts of the city, for example, in the upper part of Safi al-Din al-Hali Street, which is connected to Sadr City, there is a movement of horse-drawn carts, used by peddlers who spread from the Mawal Square in the neighboring residential areas and neighborhoods to buy used and consumable items from those areas and resell them in Sadr City.

Mixed traffic: The field observations highlight that the traffic in Baghdad is characterized by a mix of different vehicle types, sizes, and speeds. There are at least eight types of vehicles operating on the roads and streets of the city, each with its own characteristics. While expressway vehicles may be more numerous compared to slow-moving vehicles, there is a lack of proper segregation between these two types of vehicles. Both fast and slow vehicles share the same roads, leading to confusion, traffic congestion, and reduced road capacity. This phenomenon is particularly noticeable in the main streets located in the city center. One specific issue mentioned is the inadequate isolation procedures for patients. It implies that vehicles transporting patients or requiring special isolation measures are not sufficiently separated from the general traffic flow.

Road accidents: The rapid growth of traffic, lack of proper infrastructure, and inappropriate road user behavior have contributed to a significant increase in traffic accidents in Baghdad governorate. Official data on road accidents in the province indicate a 40.9% increase in accidents in 2012 compared to the number of accidents in 2010, as shown in Table (4). In 2012, the percentage of accidents in Baghdad governorate accounted for 14.5% of the total accidents reported in the provinces of the country, excluding the Kurdistan region. According to the classification based on the severity of accidents in Baghdad governorate during the period of 2010-2012, the average percentage of fatalities was 20.3%, injuries accounted for an average of 73.3%, and vehicle damage accounted for 6.4% of the total accidents, as shown in Table 15.

Analyzing the causes of these accidents, the data indicates that approximately 70% of the accidents were caused by motorists, highlighting the role of driver behavior and negligence in contributing to accidents. Around 15.9% of accidents were attributed to vehicle-related factors, which may include mechanical failures or issues with the vehicle's condition. Pedestrians were responsible for approximately 8.1% of the accidents, emphasizing the importance of pedestrian safety and awareness.

These indicators show the importance of applying strict measures to grant driving licenses to vehicle drivers, the need to impose penalties on violators of road use and adherence to speeds and traffic signals, and the importance of the quality of motorists to maintain their vehicles on an ongoing basis, as well as the tendency to maintain and rehabilitate roads and streets by the responsible authorities.

Table 21: Road accidents according to the nature of the accident in the province of Baghdad

year	The nature of the accident				
	collision	coup	run over	another	the total
2010	401	78	559	0	1038
2011	593	130	730	0	1453
2012	583	86	786	8	1462

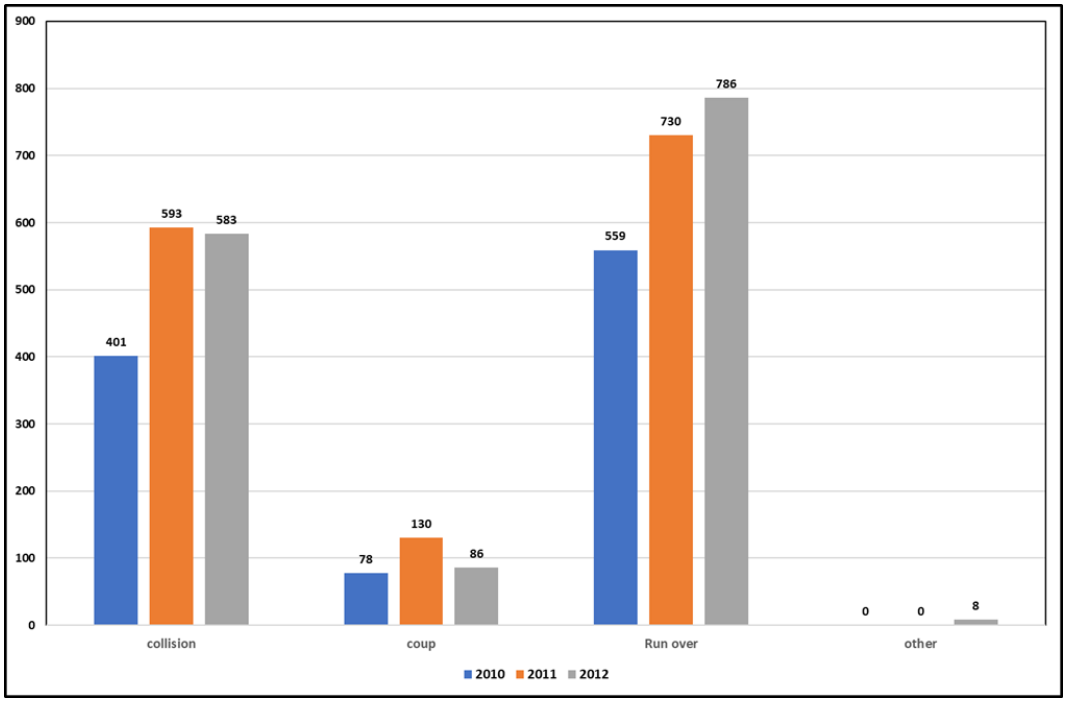


Figure 13: Road accidents according to the nature of the accident in the province of Baghdad

Table 22: Type of Roads

Pointers	Years		
	2010	**2011**	**2012**
Quick	23,0	22,3	22,4
Main	49,8	57,8	55,7
Sub	25,4	17,5	20,7
Rural	1,8	2,4	1,2

Table 23: Degree of Severity

Pointers	Year		
	2010	**2011**	**2012**
Death	21,2	18,6	21,1
Wounds	72,1	74,8	73,1
Damage	6,7	6,6	5,8

Table 24: Reason of accidents

Pointers	Year		
	2010	**2011**	**2012**
The driver	67,3	74,3	68,4
The Car	14,5	14,4	18,7
Pedestrians	11,4	6,2	6,8
The Road	6,8	5,1	4,6

4.1.3.3. Public Transport

The public transportation system in Baghdad mainly relies on buses, which are operated by two companies: the General Company for Transporting Passengers and Delegates (formerly known as the Passenger Transportation Authority) and the General Company for Private Transportation Management. Due to the urban complexity of the city, caused by population growth and the expansion of its geographical area, there is an increasing demand for public transportation services. However, the economic blockade on the country in the 1990s and the political instability following 2003 resulted in a decline in the public transportation system. Efforts are now being made to reactivate and improve the services of the General Company for Transporting Passengers and Delegates by importing new buses with a capacity of 80 passengers and restoring service routes in various parts of the city.

The number of buses operating in Baghdad has varied over time. Between 1996 and 2003, there were 677 buses with an actual operating rate of 71.5%. However, these buses were gradually consumed and sold in public auctions. From 2009 to 2012, 615 new buses were acquired, but the actual operating rate decreased to 50.4%. This decrease can be attributed to the challenges of ensuring the safety of bus routes in many neighborhoods and regions of Baghdad, as well as competition from privately operated vehicles with a capacity of 11-18 passengers that provide faster transportation options.

As a result of the decrease in the number of public buses, the number of passengers using these buses annually has also declined. Comparing the periods 1996-1993 and 2009-2012, there was a ratio of 1.17:1 and 1:20.1 decrease in passenger numbers, respectively. These figures highlight the need for further improvements and investments in the public transportation system to meet the growing demand for transportation services in Baghdad.

Table 25: Number of public transport buses and commuting passengers in Baghdad **(149)**

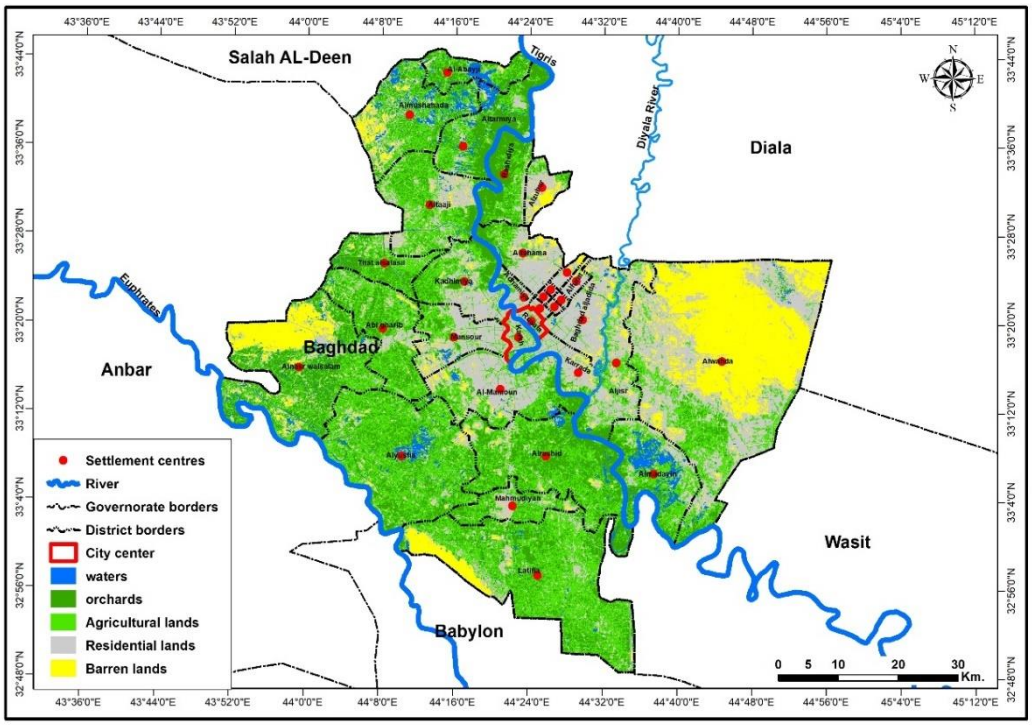
The number of passengers per year/million	the number of operating buses	the total number of buses	Year
230.85	613	1130	1086-1083
197.90	484	677	1996-1993
9.58	310	615	2012-2009

4.1.4. Urban Expansion and Agriculture Land Use Changes

Desertification has emerged as a global challenge affecting both poor and rich countries. Developing nations face significant pressure due to rapid population growth and its subsequent impact on resources, especially agricultural lands surrounding urban areas. The encroachment of urbanization on these vital agricultural lands is causing a steady decline in their availability. As urbanization continues to expand worldwide, the demand for land for housing and various human services intensifies. Transportation infrastructure also contributes to the encroachment of urbanization on agricultural lands, with roads being built and factories, facilities, and commercial activities being established along these routes. Additionally, inadequate urban planning exacerbates the situation by facilitating urban expansion at the expense of agricultural lands. The behavioral factor is another influential aspect, as residents often express a desire to live in suburban areas outside of cities, further contributing to the depletion of agricultural lands. The map 6 and Tables 6-13 show the changes in land use in Baghdad. **(150).**

149 The General Company for Passenger Transport, Planning and Follow-up Department, unpublished data, 2012

150 Adam, Buthaina Hussein Muhammad, 2014, studying population growth and its impact on social services in the state of Khartoum, an applied study on Omdurman locality during the period (1983-2014 AD), a master's thesis, Omdurman Islamic University.



Map 13: Land Use in Baghdad, 2020, Source: Researcher's work: land sat 8, 2020

Land use in Baghdad reflects the city's historical significance, urban growth, economic activities, and cultural heritage. Residential areas, commercial zones, historical landmarks, agriculture, open spaces, and transportation infrastructure all play essential roles in shaping the city's landscape. As Baghdad continues to evolve, it is crucial to balance the preservation of cultural heritage with the development of sustainable and vibrant urban spaces. Residential areas make up a significant portion of Baghdad's land use. The city is home to millions of residents, and it has witnessed rapid urbanization in recent decades. Residential neighborhoods vary in character and socioeconomic status, ranging from affluent areas with modern houses and amenities to more traditional and densely populated districts with older structures. The city's population growth has resulted in the expansion of residential areas into previously undeveloped or agricultural land.

Table 26: Stages of Urban Expansion at the Expense of Agricultural Lands: the first Stage for the Period Between (2003)-and- (2009)

Name of Municipality	Total Area/ km2	Agricultural %Use Rate	Percentage of Other Uses	Population	Resettled (Countryside)	Rank
Alshaeb	78.085	80.35	19.65	174,595	4,750	**4**
Alghadir	40.71	37.89	62.11	79,545	–	**11**
baghdadaljadida	69.3975	63.35	36.65	1,034,534	-----	**7**
Alrasafa	22.7325	2.85	87.15	1,486,799	-------	**14**
Karrada	65.2175	58.23	41.77	271,977	------	**8**
alsdr1	14.1725	39.97	60.03	582,067	------	**10**
Alsdr2	28.615	50.15	49.85	413,683	-------	**9**
Adhamiya	25.6075	35.25	64.75	956,629	32,371	**13**
Al-Mansour	1258275	68,72	31.28	371,189	------	**6**
Alrashid	12016	89.98	10.02	13,311	57,179	**2**
Alshaela	89.8875	87.54	12.46	52,245	87,697	**3**
Alkarakh	25.5475	37.12	62.88	1,309,488	------	**12**
Aldawra	83.12	91.74	8.26	12,764	70,110	**1**
Al-Kadhimiya	56.42	78.89	21.11	626,504	114,180	**5**
Total area of land use forthe city of Baghdad by administrative units for the period (2003) (2009).	**Alrasafa**	**349.5375km2**	**850.5 km2**			
	Alkarakh	500.9625km2				
Total population of the city of Baghdad between the time period (2003) (2009) and according to environmental use.	Rural	860,220	**6,702,538**			
	Urban	**5,842,318**				

Source: Journal of the College of Education for Girls, Indiscriminate Urbanization and Degradation of Agricultural Lands in the City of Baghdad 2003-2017 Ahmed Abbas Kazem

Table 27: Effect of Urban Expansion on the Proportion of Agricultural Land Use

P value	Level of Significance (P Value)	Calculated (F Value)	Calculated (tValue)	Constant Term (α)	Regression Coefficient (β)	The Coefficient of Determination R^2
High significant	0.003	13.800**	3.715**	79.154	3.874E-5	0.534

Table 28: Stages of Urban Expansion at the Expense of Agricultural Lands: The First Stage for the Period Between (2009)-and- (2012)

The name of the municipality	Total Area/ km2	Agricultural %use Rate	The Percentage of Other Uses	Population Preparation (Attended)	Resettled (Countryside)	Rank
alshaeb	83.085	66,51	33.49	189,264	5,092	4
alghadir	25.62	31.23	66.77	86,228	-------	12
baghdadaljadida	45.706	64	36	1,121,454	-------	7
alrasafa	28.566	23.11	100	1,611,717	--------	14
Karrada	60.72	56.57	41.44	294,828	-------	9
alsdr1	21,38	58.79	41,21	630,971	-------	8
Alsdr2	25.62	47,65	52,36	448,440	-------	11
Adhamiya	82.085	66.51	33,49	1,037,003	34,700	5
Al-Mansour	352.4521	49.14	33,51	402,376	-----	10
alrashid	117.6365	66,46	21.8	14,429	61,292	6
alshaela	893657	78.2	23.38	56,635	94,005	1
alkarakh	31.5476	67.64	76,8	1,419,509	--------	2
aldawra	84.1275	23.2	23.37	13,836	110,225	13
Al-Kadhimiya	504025	66.88	33.13	679,142	122,394	3
Total area of land use for the city of Baghdad by administrative units for the period (2003) (2009).	Alrasafa	352.412km2	853.335km2			
	Alkarakh	500.9225km2				

total population of the city of Baghdad between the time period from (2003) to (2009) and according to environmental use.	Rural	922,100	7,255,278
	Urban	6,333,179	

Source: As above

Table 29: Effect of Urban Expansion on the Proportion of Agricultural Land Use: The Second Period between 2009 –and- 2012

P Value	level of Significance (P Value)	Calculated (F Value)	Calculated (t Value)	Constant Term(α)	Regression Coefficient (β)	The Coefficient Of Determination R^2
Not significant	0.942	0,006	0.075	55.112	0.87E-7	0.049

Table 30: Stages of Urban Expansion at the Expense of Agricultural Lands: The First Stage for the Period between 2012-and-2017

Name of Municipality	Total Area/ km2	Agricultural %Use Rate	Percentage of Other Uses	Population Preparation (Attended)	Resettled (Countryside)	Rank
Alshaeb	88.0875	58.9	41.1	218,437	5,573	4
Alghadir	43.2075	25	75	99,519	-----	11
baghdadaljadida	66.41	61.6	38.4	1,294,313	------	3
Alrasafa	21.235	0	100	1,860,146	------	13
Karrada	62.7175	55.94	44.6	340,273	------	7
alsdr1	19.92	26.04	73.96	728,229	------	10
Alsdr2	30.245	37.9	62.1	517,562	------	9
Adhamiya	28.1075	19.76	80.24	1,196,846	37,982	12
Al-Mansour	128.33	56.61	43.39	464,397	-----	5
Alrashid	96.125	53.24	46.76	16,653	67,090	8
Alshaela	97.385	68.05	31.95	65,364	102,898	1
Alkarakh	28.8	0	100	1,638,311	-----	14
Aldawra	65.6175	66	34	15,969	120,652	2

Al-Kadhimiya	58.9175	56	44	783,824	133,971	6
Total area of land use for the city ofBaghdad by administrative units for the period between (2003) and (2009)		alrasafa	359.93 km2	855.105km2		
		alkarakh	495.175 km2			
Total population of the city of Baghdadbetween the time period (2003) and (2009,) and according to environmental use		Rural	1,009,325	8,318,695		
		Urban	7,309,369			

Source: As above

Table 31: Effect of Urban Expansion on the Percentage of Agricultural Land Use: The Third Period between 2012-and 2017

Nature of Relationship	Significance Level p	Calculated F Value	Calculated t Value	Fixed Limit α	Regression Coefficient β	The Coefficient of Determination^{R2}
High morale	0.005	11.728**	3.425 **	59.512	2.685E-5	0.501

Table 32: Stages of Urban Expansion at the Expense of Agricultural Lands: The First Stage for the Period between 2017-and- 2020

Name of Municipality	Total Area / km2	Agricultural Use %Rate	Percentageof Other Uses	Population Preparation (Attended)	Resettled (Countryside)	Rank
alshaeb	80.5775	36.15	63.85	237,759	5,873	7
alghadir	42.305	18.08	81.92	108,322	------	11
baghdadaljadida	76,565	25.54	74.46	1,408,803	------	9
alrasafa	25.4325	1.95	98.05	2,024,687	------	13
Karrada	67.315	20.75	79.25	370,372	-----	10
alsdr1	19.8175	25.84	74.16	792,645	------	8
Alsdr2	29.66	36.48	63.52	563,344	------	6
Adhamiya	33.7775	8.17	91.83	1,302,714	40,027	12
Al-Mansour	124.58	40.51	59.49	505,476	------	5
alrashid	90.16	45.72	54.28	18,127	70,703	3

alshaela	92.3925	40.9	59.1	71,146	108,438	4
alkarakh	30.5475	-	100	1,783,229	-----	14
aldawra	80.6175	59.63	40.37	17,382	127,148	1
Al-Kadhimiya	59.42	46.86	53.14	853,158	141,185	2

Total area of land use for the city of Baghdad by administrative units for the period (2003) (2009)	Alrasafa	375.45km2	858.1675km2
	Alkarakh	482.7175km2	
total population of the city ofBaghdad between the time period (2003) (2009) and according to environmental use	Rural	1,063,673	9,019,600
	Urban	7,955,928	

Source: As above

Table 33: Effect of Urban Expansion on the Percentage of Agricultural Land Use: The Fourth Period from 2017 –and-on

Nature of Relationship	Significance Level p	Calculated F Value	Calculated t Value	Calculated t Value	Regression Coefficient β	The coefficient of determination^{R2}
High morale	0.00	15.493**	3.963 **	43.334	1.991E-5	0.564

Note. It means that the relationship is very high with 99% confidence.

Agriculture is one of the important uses of the land that takes up a wide spatial space and constitutes an important activity in the city. In the realm of agricultural development processes, the indicators associated with this field have not been able to effectively meet the established objectives. The data reveals that the contribution of the agricultural sector to the gross domestic product was approximately 36% in the 1950s. However, this percentage gradually decreased over time. By 1988, it had declined to 13.8%, and further dropped to 7.1% in 2005. This decline in production and productivity coincided with a persistent increase in demand, leading to a widening food gap. **(151).**

[151] Abd al-Hussein Muhammad al-Anbaki, Economic Reform in Iraq, Baghdad, 2005, pg. 68.

4.1.4.1. Challenges faced in Agriculture Land Use

1. Through the data of the Ministry of Environment, the Department of Planning and Follow-up, it appeared that there are neglected, abandoned and unused agricultural areas amounting to (85,000), while the area of salinized land amounted to (29,000) dunums, which are lands that represent part of the agricultural land area, and that such a phenomenon represents a waste of investment A limited resource that cannot be replaced.

2. The decline in government support for production requirements, as mechanization, credit, marketing, extension, training, prevention, control and fertilization services are still below ambition and below the level of development, as well as the total openness of Iraqi markets to competition with imported agricultural commodities has led to the inability of much of local production to compete.

3. The small area of the farm in the study area, as the data indicate that the percentage of farms whose area is less than (5) dunums is 76%, while the percentage of farms whose area is More than 5 dunums, 24%, and the small area of the farm can be attributed to the fragmentation of agricultural holdings, razing them and converting them to residential uses.

4. A large percentage of farmers are not full-time for agricultural work, as the percentage reached 66% doing other work, and this is due to the low income of the farms and their lack of support and assistance, which prompted large numbers of them to work in other fields, which led to the neglect of the farm Most of the full-time agricultural workers are elderly and have traditional experience.

5. The urban expansion accompanying the rapid population increase depletes large areas of agricultural lands, but rather depletes the most fertile lands, which negatively affects agricultural production.

Consequently, the negative consequences of this situation have had a detrimental impact on agricultural lands. Large rural areas have been converted to alternative uses, posing a significant challenge for agricultural land. The issue at hand extends beyond the partial and economic utilization of these lands. Rather, it stems from intense competition from other sectors, resulting from unfavorable development processes. Agricultural lands are being converted for residential, industrial, or commercial

purposes, particularly since 2003 when government control became lax. This has encouraged landowners to subdivide their agricultural lands into small residential plots and sell them off. Furthermore, there has been a shift in the economic value of land, with high prices per square meter in the city center, where commercial activities are concentrated.

The rise of institutions and companies has made it increasingly difficult to find sufficient land within urban areas for housing construction. As a consequence, residential land prices have soared, exacerbating rental rates and making it challenging for families with low incomes to afford housing. Consequently, individuals have sought alternative solutions, such as informal settlements, due to the relatively lower cost of land and construction materials for residential homes.

The increase in the urban land area has been accompanied by a significant increase in the city's population. The city witnessed a population increase, the city's population in the year (2010) reached (7,717) people after it increased. It was (2,748) people in 1977 Table 10 (152).

As a result, there has been a surge in the demand for housing units, leading to the expansion of the city at the expense of agricultural lands. In the city of Baghdad, for instance, the area of agricultural lands dwindled from approximately 3,565.35 dunums during the period of 1970-1979 to 197,144 dunums in the period of 1980-1989.

It further decreased to 184,678 dunums in the period of 1990-1999 and 134,168 dunums in the period of 2000-2011. Conversely, the data indicates that the area allocated for residential use in Baghdad from 2000-2011 was approximately 164,436 dunums. Furthermore, according to statistics from the Ministry of Commerce in 2010, the number of families reached 1,305,745, while the number of housing units stood at 531,764. These figures clearly demonstrate a deficit in the number of available housing units. Please refer to the table for further details. **(153).**

[152] Khawla Gharib Faraj, Urban Expansion and its Impact on the Decline of Agricultural Lands in the City of Baghdad, PhD thesis, College of Literature, University of Baghdad, unpublished, in 2011, p. 262.
[153] Othman Muhammad Ghoneim, Rural and Urban Land Uses, Dar Safaa for Publishing and Distribution, Amman, 2002, p. 105.

Table 34: The size and area of agricultural land in Baghdad from 1970-2010

Years	Land area / acres	Agricultural land area / dunam
1970 -1979	340200	256535
1980-1989	341334	179144
1990-1999	342942	184678
2000-2010	343267	134168

The increase in the percentage of the urban population in general is due to a number of factors:

1. The natural growth of the urban population because of an increase in births and a decrease in mortality as a result of improved health care.

2. Population migration from rural to urban areas, and one of its most notable effects was the initial transition from the agricultural and pastoral economy to the service sector, which changed the occupational makeup of the labour force.

3. The growth in urban populations brought on by the reclassification of settlement centres and the conversion of some rural settlement centres (villages) into cities that are considered sub-district centres. Villages become cities as a result of the provision of municipal services.

4. Internal migration between the Iraqi provinces from those that were exposed to security disturbances after 2003. Many Iraqis were forced to move to safer areas in Iraq as a result of the violence. Which in turn caused the expansion of urban centers in Baghdad and was reflected in the social life of the local population there.

5. The phenomenon of urban sprawl into the countryside led to the annexation of some villages and their transformation into residential areas within large cities, such as the conversion of the villages of Al-Dora, Al-Fahhama, and Al-Zafaraniya into residential neighborhoods within the greater city of Baghdad. After 1997, this behavior became much more prevalent.

6. Most of the economic and social activities are concentrated in the governorate, which occupied the first four ranks in terms of the percentage of the urban population, which increased the ability of the governorate to absorb more residents from rural areas

and from other governorates that are characterized by their weak ability to provide job opportunities due to the lack of economic activities.

The lack of environmental awareness and the limited understanding of the authorities regarding the significance of implementing a comprehensive planning policy to accommodate urban growth and regulate land use has intensified the issue of urban sprawl in Baghdad. Consequently, the established city plans have been disregarded, leading to changes in land use patterns and the unplanned proliferation of housing on the city's outskirts. This uncontrolled expansion has overwhelmed the existing infrastructure and services, which are ill-equipped to handle the increasing population. Additionally, substantial agricultural land has been lost in the process. **(154)** The circumstances have resulted in a severe shortage of housing units relative to the low number of families in need. The field study demonstrates the negative consequences of random urban expansion on the city and its surrounding areas. This includes a decline in the efficiency of land use, deterioration of social services and infrastructure, and degradation of the urban environment. With high population density, overcrowded residential units, poor-quality building materials, and substandard specifications, the dwellings fail to provide adequate protection against natural elements and a suitable environment for families. Consequently, residents experience health and psychological issues, particularly given the high average family size of six individuals in these neighborhoods. Moreover, the aesthetic character and overall appearance of the city are negatively affected by this unplanned urban expansion and its impact on land use.

Urban land uses are characterized by rapid and continuous change, in addition to being characterized by extreme diversity. The diversity of urban activities and the rapid pace of change are closely linked to the nature of urban communities, which are constantly evolving in response to the changing needs and demands of society. As the city center becomes more congested, urban expansion has started to spread towards the outskirts. However, this expansion has resulted in the loss of large areas of fertile agricultural land. For instance, industrial and residential facilities have been established

[154] Random urban expansion, which means unplanned urban sprawl that exceeds the basic plans of cities and takes place at the expense of the surrounding agricultural lands, which occurs as a result of economic and social considerations, as well as poor planning and municipality concerned with urban planning

in areas like Al-Taji and Sabaa Al-Bour. The projects in Al-Taji cover an area of 1,052 dunums, contributing to the loss of agricultural land.

The findings from the questionnaire indicate that 31% of residents in That Al-Salasil consider urban expansion as a major factor contributing to the decline of agricultural land, while 34% of residents in the Al-Taji district attribute the recession of agricultural land to urban expansion. This highlights the perception among the community that urban expansion is a significant issue impacting agricultural land and reducing its availability. **(155)**. **(156)**. In another study, (31%) of the residents of Al-Madaen district and (28%) of Al-Jisr district attribute the shrinking of agricultural lands and their deterioration to urban expansion due to the increase in population numbers and the continuation of family division, thus increasing the demand for housing units.

The trend towards establishing projects such as fish and poultry farming often comes at the expense of fertile agricultural land. The deduction of large areas of arable land has resulted in its deterioration, primarily due to increased salinity, water contamination, and soil pollution from solid and liquid animal waste. Furthermore, the expansion of such projects without stringent controls has further exacerbated the impact on fertile agricultural land, leading to its removal from the production process. According to the data, the district of Al-Madaen has witnessed the loss of 5,462 dunums of fertile agricultural land to animal projects and an additional 770 dunums to urban expansion. These significant losses of agricultural land have had a detrimental effect on agricultural production in the area. **(157)** Through the field study, we noticed large-scale violations of agricultural orchards, as palm groves are bulldozed, cut and converted from agricultural orchards to random dwellings and workshops such as car repair workshops, blacksmithing, plumbing, plumbing, and shops.

[155] Sfax, Qasim Hadi, Urban Expansion and its Impact on Agricultural Lands, Master Thesis, Faculty of Arts, unpublished, 2009, p. 253.
[156] Amal Sabah Hassan, Urban Expansion and its Impact on Agricultural Land Area in Al-Madaen District, Master Thesis, College of Literature, unpublished, 2012, p. 193
[157] Sameh Gharaibeh, The Introduction to Environmental Sciences, Dar Al-Shorouk, Amman 2000, p. 424

4.1.4.2. The effects of urbanization on the use of agricultural land

1- Reducing the cultivated areas around the cities and increasing the area of built-up areas.

2- The eradication of agricultural lands and the spread of urbanization helps to one degree or another in paving the way for desertification.

3- The random growth of dwellings contributes to pollution and disruption of the ecosystem.

4- Decreased per capita share of productive agricultural land in the world.

5-. Elimination of vegetation covers surrounding cities that harms the environment around cities, and the elimination of vegetation cover. It is known that agricultural lands are subject to pressures and erosion resulting from urban sprawl, the urbanization process and the large number of human activities, so that the effects on agricultural lands affect the area of the area. Productive agricultural and urban growth leads to the depletion of many natural resources, including fertile agricultural lands. so there was an urgent need to adopt (158).

Comprehensive and integrated development plans to restore balance between urban expansion and the surrounding agricultural lands are required. Scientific progress and limiting the effects of urban expansion on agricultural lands: As a result of sound scientific planning, some solutions to the problem of urban expansion on agricultural lands have been reached, including:

- Developing policies related to the management and use of land in and around cities that take into account the expansion and growth of residential communities and the development of laws regulating city boundaries.
- Establishment of institutions specialized in urban planning within the city, responsible for controlling the organization and controlling the organization **(159)**.

[158] Muhammad, Muhammad al-Fatih Bakir, 2004 AD, Economic Geography: Foundations of Applications, Dar al-Marefa al-Jami`iyya for printing, publishing and distribution, Alexandria, p. 122
[159] Said, 1993 AD, Geography of the Arab World, Damascus University, Anglo Library, Cairo, p. 66(7172).

- Reducing the horizontal extension of urban expansion at the expense of agricultural lands by expanding the vertical extension (vertical) of residential buildings.
- Good planning for the sites of industrial establishments so that they are not built at the expense of arable agricultural lands.
- Directing future urban expansion to unproductive areas and improving pollution control and control.

4.2. Reviews of Local Community on Impacts of Urban Expansion

4.2.1. Validity and Reliability of Questionnaire

The study questionnaire was developed based on the theoretical framework and previous studies on the subject. The questionnaire consisted of three parts: The first part includes a set of demographic information about the research sample including gender, age, educational qualification, place of residence. The second part of the research includes questions related to two variables: urban expansion and the efficiency of services. These questions were developed based on a review of previous studies that have explored the topic of urban expansion, including the works of Carbulio (2021), Abd (2015), Al-Zuhairi and Mouji (2021), Kazem et al. (2021), and Muhammad (2019). Modifications were made to adapt the questions to the characteristics of the sample that will be surveyed. The questionnaires were distributed across various areas of the city.

- Reasons for Urban Expansion: 1-5
- Efficiency of educational services: 6-1-22
- Health services efficiency: 11-15 -3
- Transportation services efficiency: 16-20

To ensure the validity of the questionnaire's questions, the researcher conducted a preliminary application on a sample of beneficiaries who have experienced urban expansion in agricultural areas in Baghdad. The sample size consisted of 30 individuals. The results of this preliminary survey are presented in the following table.

Table 35: Results of pilot survey

Variable	Sample
Male	15
Female	15
Total	30

The researcher conducted the experiment and found that the questions used to measure the research variables are clear and understandable. The average time required to answer the questionnaire was determined to be 9 minutes.

Validity is a fundamental statistical characteristic of any questionnaire. It reflects the accuracy and truthfulness of the statements or paragraphs included in the questionnaire to measure the studied variable. There are several indications of validity.

1- Expert Validation: Expert validation is a commonly used method to ensure the honesty of a questionnaire. It involves presenting the questionnaire to a sample of experts who evaluate its linguistic and scientific quality and its relevance to the variable being measured. **(160)** Consequently, the researcher presented the questionnaire, along with the theoretical definition of each variable and its related domains, the type of alternatives used, and the intended application context, to a sample of experts and arbitrators (10), The researcher requested them to assess the clarity of the paragraphs, their linguistic coherence, and their relevance to the respective domains. The researcher considered a minimum agreement percentage of (80%) within the sample as an indicator of sufficient consensus. Internal consistency validity : It is another important aspect of questionnaire validity. It assesses the extent to which the items within the questionnaire are internally consistent and measures the intended variable. It is typically evaluated by examining the relationship between the scores of individual items and the total score of the questionnaire. The Pearson correlation coefficient is commonly used to determine this relationship. A higher correlation coefficient indicates greater internal consistency and provides evidence for the validity of the questionnaire. **161).**

[160] Kamel Thamer Al-Kibsi, The Relationship between Logical Analysis and Statistical Analysis of the Items of Psychological Measurements, Al-Ustad Journal, College of Education, Ibn Rushd, Issue 25, 2001: p. 171

[161] Smith, M. (1966) "The Relationship Between item Validity and test validity, Psychometric. Vol.1. p70

In order to be able to measure the validity of the internal consistency of the questionnaires, the researcher used the correlation coefficient (Pearson) between the total score and the score of the responses, as shown in the following table. Therefore, the researcher resorted to measuring the validity of the internal consistency of the questionnaire items by using the Pearson correlation coefficient to calculate the relationship between the response score and the total score of the questionnaire, as shown in the following table. **(162)**

Table 36: Correlation of the responses with the total score of the questionnaire

Question number	Correlation of the question with the total score	question number	Correlation of the questions with the total score
1	0.345	11	0.436
2	0.457	12	0.423
3	0.576	13	0.421
4	0.348	14	0.467
5	0.328	15	0.458
6	0.567	16	0.548
7	0.456	17	0.735
8	0.427	18	0.876
9	0.347	19	0.474
10	0.616	20	0.547

Through the previous table, it is clear to the researcher that the calculated values of the questionnaire items were greater than the tabular values, and this means that there is homogeneity and internal consistency between the questionnaire items in measuring the variable to be measured.

Reliability is an essential statistical characteristic that is closely related to the stability and consistency of a questionnaire's measurements. One commonly used method to assess reliability is the Test-Retest method. The researcher assessed the reliability of the questionnaire by conducting a Test-Retest method. The questionnaire

[162] The tabular value of the correlation coefficient at the degree of freedom (149) and the level of significance: (0.05): 0.161, (0.01): 0.210, (0.001): 0.267

was administered to a sample of 40 individuals who were beneficiaries of urban expansion. After a two-week interval, the same questionnaire was administered again to the same sample under identical conditions. The stability value, as measured by the Pearson correlation coefficient, was found to be 0.86 **(163)**

Reliability has been calculated in two ways, as follows:

The Cronbach method (Alpha Cronbach, 1951):

The (Alpha Cronbach) equation was applied to the stability sample, which amounted to (40) individuals from the beneficiaries of urban expansion, and the stability value was 0.83. After we have verified the statistical characteristics of the current research tool of validity and reliability, it has been applied to the application sample of (300) individuals benefiting from urban expansion.

Statistical means

The researcher used the following statistical methods:

- Weight percentile
- Duplicates
- Pearson correlation coefficient
- Cronbach's alpha equation

4.2.2. Descriptive Statistics of Respondents

Here we will explain the nature of the demographic variables of the statistical analysis sample according to the following variables:

1. Gender:

Table 37: Demographic variables by Gender

Variables	x	%
Gender		
Male	200	66%

[163] Mustafa Mahmoud Al-Imam, Calendar and Measurement, Dar Al-Hikma, first edition, Baghdad, 1990: p. 143

Female	100	33%
the total	300	100%

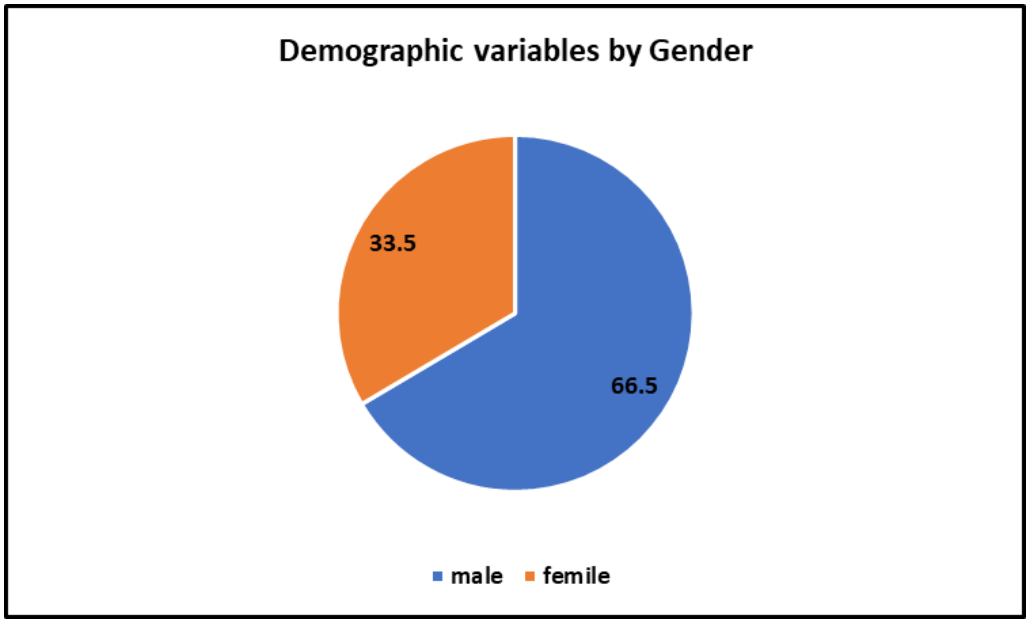


Figure 14: Sample distribution by Gender

2. Age:

Table 38: Demographic variables by age

Variables	X	%
Age		
31 Minimal	90	30%
31-39	39	13%
40-49	70	23%
50-59	51	17%
60 More	50	17%
the total	300	100%

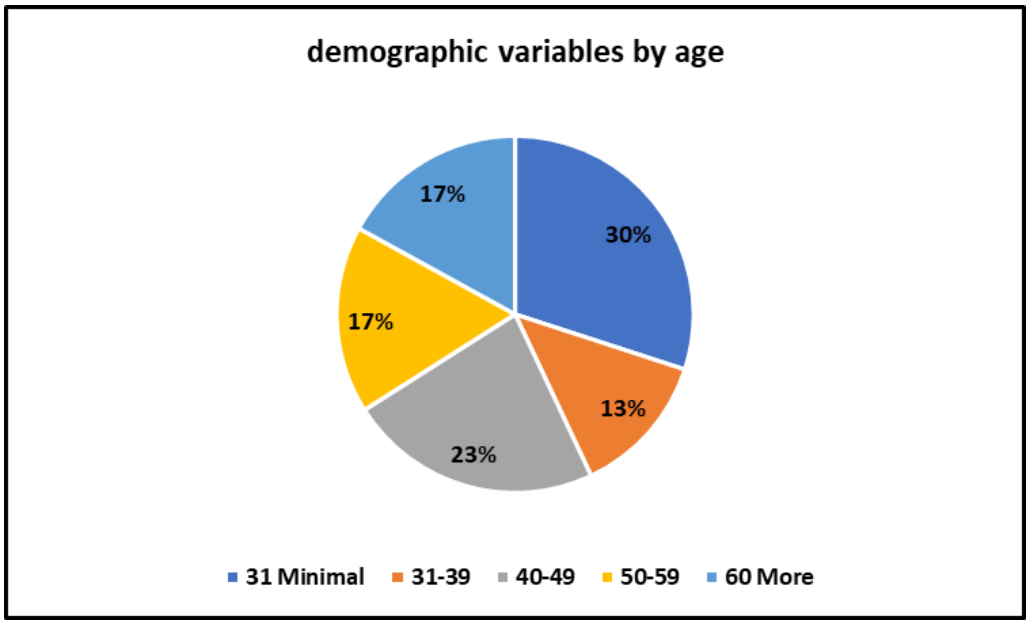


Figure 15: Demographic variables by age

3. Education qualification:

Table 39: Demographic variables according to the scientific qualification

Variables	X	%
Qualification		
BA	140	47%
Higher Diploma	40	13%
Master's	60	20%
PhD	60	20%
the total	300	100%

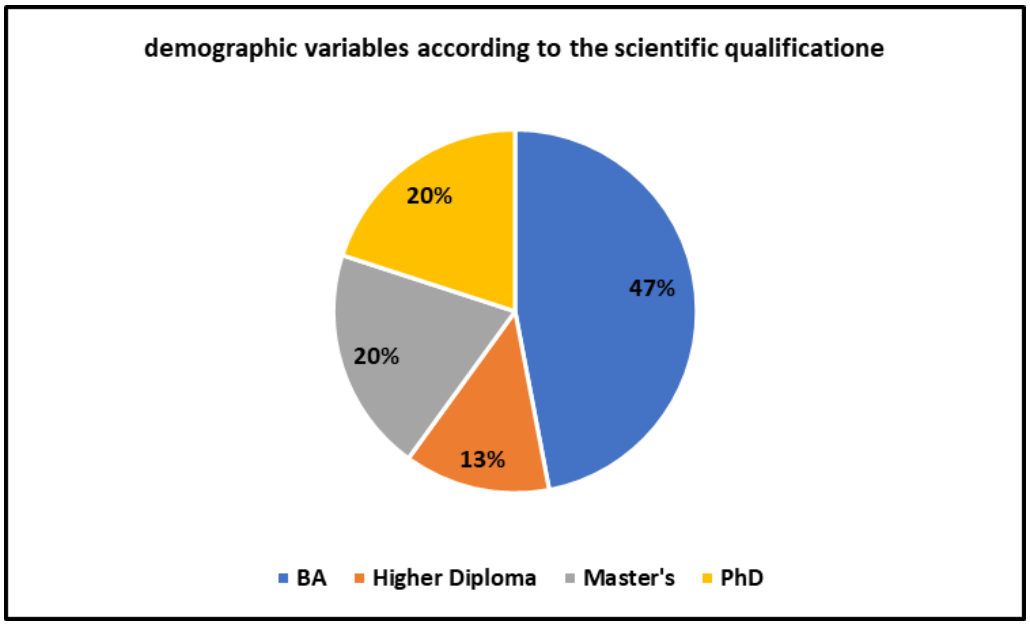


Figure 16: Education qualification

4. Place of residence:

Table 40: Demographic variables according to the place of housing

Variables	X	%
place of housing		
Dora	80	27%
Kadhimiya	60	20%
Al-Zafaraniya	40	13%
Abu Ghraib	70	23%
Alshuela	50	17%
the total	300	100%

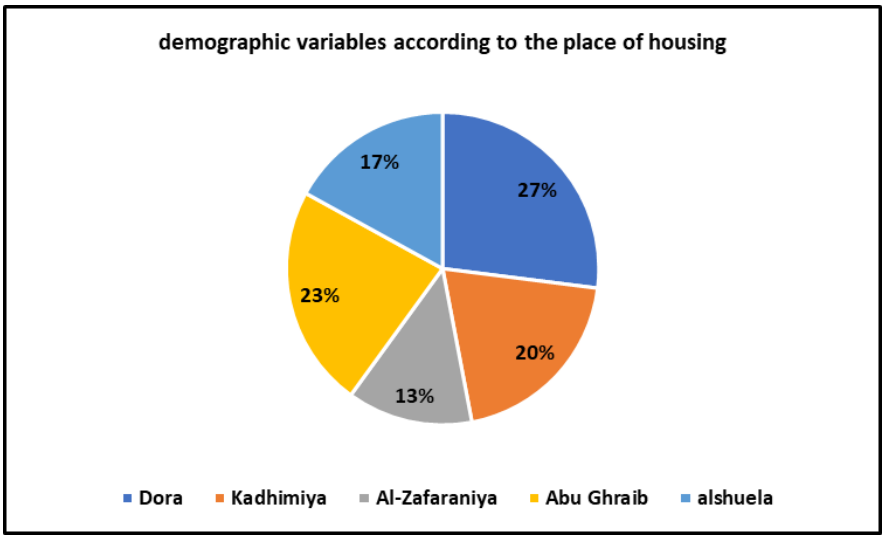


Figure 17: The demographic variables of the sample according to the place of residence

4.2.3. Results of Analysis

After analyzing the questionnaire responses, we employed Pearson correlation coefficient the method of frequencies and percentages to examine each question. We interpreted the results based on the respective field to which the questions belong. The following section presents the findings and their analysis.

4.2.3.1. Variations in Responses According to Gender

Are there statistically significant differences at the level of significance ($a \leq 0.05$) in the estimates of the sample members about urban expansion and its impact on services in the city of Baghdad due to (gender, age, educational qualification, job experience, workplace)? To answer this hypothesis, the arithmetic means, standard deviations, and (one-way Anova) were used, as follows:

Table 41: Arithmetic means and standard deviations of responses according to Gender

Variable	Categories	SMA	Standard Deviation
Gender	Male	3,946	713
	Female	3,925	757

Table 31 shows an apparent variation in the arithmetic means and standard deviations of the differences in statistically significant differences at the level of significance (a ≤ 0.05) in the estimates of the sample, physics teachers, about urban expansion and its impact on services in the city of Baghdad due to (Gender) due to the different categories of Gender variables (Male/Female). In order to show the significance of the statistical differences and the significance of these differences between the arithmetic means, one-way analysis of variance and table 32 were used.

Table 42: The results of the analysis of variance (One-way Anova) for the differences in the answers of the study sample due to gender

variable	The source of the contrast	Total squares	DF Freedom degrees	Medium	The value of the calculated F.	The value of the tabular F.	Sig's morale level
Gender	Between groups	5,746	1	5,74	12,069	3,92	1
	Inside groups	237,10	137	476			
	Total contrast	242,85	138				

It is clear from the results presented in the table 32 that the calculated value of F is (12,069) and its tabular value is (3.92). By comparison between them, it is clear that the calculated value of F is greater than the tabular value, and according to the decision rule, it states that if the calculated F is greater than the tabular F, then this It means that "there are statistically significant differences at the significance level (α≤ 0.05) in the sample's estimates due to (Gender)", and this is confirmed by the significance level (.001), which is less than 0.05.

4.2.3.2. Variations in Responses According to Academic Qualification

Table 43: Arithmetic means and standard deviations of the effect of urban expansion on services attributed to (educational qualification)

Variable	Categories	SMA	standard deviation
Scientific qualification	Bachelor's	3,919	769
	Master's	3,974	787
	PhD	3,942	771

Table 33 shows an apparent variation in the arithmetic means and standard deviations of the differences in the estimates of the sample about the impact of urban expansion on services in the city of Baghdad attributed to (educational qualification) due to the different categories of educational qualification variables (Bachelor, Master, PhD). In order to show the significance of the statistical differences and the significance of these differences between the arithmetic means, one-way analysis of variance and table (34) was used.

Table 44: The results of the analysis of variance (One-way Anova) for the differences in the answers of the study sample are attributed to the educational qualification

variable	The source of the contrast	Total squares	DF Freedom degrees	Medium	The value of the calculated	The value of the tabular F.	Sig's morale level
Scientific qualification	Between groups	57	2	29	4,059	3,93	3
	Inside groups	242,79	137	489			
	Total contrast	242,85	138				

It is clear from the results presented in the table (34) that the calculated value of F is (4,059) and its tabular value is (3.92). By comparing them, it is clear that the calculated value of F is greater than the tabular value, and according to the decision rule that states that if the calculated F is greater than the tabular F, then This means that "there

are statistically significant differences at the level of significance (a≤0.05) in the estimates of the respondents due to (educational qualification)", and this is confirmed by the level of significance (.003), which is less than 0.05. To determine the source of these differences, the Scheffe test was used.

Table 45: The results of the Scheffe test for the differences in the answers attributed to the educational stage

Categories	Bachelor's	Master's	PhD	SMA
Bachelor's	-	0,49	*0,69	3,919
Master's		-	0,45	3,974
PhD			-	3,942

Table (35) shows that there are differences between the results, as the differences tend in favor of the PhD category.

4.2.3.3. Variations in Responses According to Professional Experience

Table 46: Arithmetic means and standard deviations of the effect of urban expansion and services due to (years of job experience)

Variable	Categories	SMA	standard deviation
Years of Experience	Less than 5 years	3,917	694
	From 5 years- less than 10 years	3,958	723
	10 years or more	3,962	775

Table (36) shows an apparent variation in the arithmetic means and standard deviations of the differences due to the effect of urban expansion according to the variable years of experience (less than 5 years - more than 5 years - less than 10 years - 10 years or more). In order to show the significance of the statistical differences and the significance of these differences between the arithmetic means, one-way analysis of variance was used and Table (37).

Table 47: The results of the analysis of variance (One-way Anova) for the differences in the answers of the study sample due to the years of job experience

Variable	The source of the contrast	Total squares	DF Freedom degrees	Medium	The value of the calculated	The value of the tabular F.	Sig's morale level
Years of Experience	Between groups	762	2	381	4,782	3,92	2
	Inside groups	242,08	137	487			
	Total contrast	242,85	138				

It is clear from the results presented in the table ( ) that the calculated value of F is (4,782) and its tabular value is (3.92). Comparing them, it is clear that the calculated value of F is greater than the tabular value, and according to the decision rule that states that if the calculated F is greater than the tabular F, then This means "there are statistically significant differences at the level of significance (a≤0.05) in the estimates of the physics teachers for the effect of urban expansion in services due to (years of experience) and this is confirmed by the level of significance (.002), which is less than 0.05. And to determine the source These differences were used Scheffe test.

Table 48: Scheffe test results for differences in responses attributed to years of job experience

Categories	Less than 5 years	From 5 years- less than 10 years	10 years or more	SMA
Less than 5 years	-	0,37	*0,59	3,917
From 5 years- less than 10 years		-	0,45	3,958
10 years or more			-	3,962

It is clear from the table (38) that there are differences between the results, as the differences tend in favor of the category of 10 years and over.

4.2.3.4. Variations in Responses According to Age

Table 49: Arithmetic means and standard deviations of the effect of urban expansion on services due to (age)

variable	Categories	SMA	standard deviation
the age	Less than 25 years old	3,717	790
	25 - 30 years	3,741	688
	31 - 40 years old	3,714	679
	41-50 years	3,711	730

Table (39) shows an apparent variation in the arithmetic means and standard deviations of the differences in the arithmetic means and standard deviations of the effect of urban expansion in services due to (age) due to the different categories of age variables. In order to show the significance of the statistical differences and the significance of these differences between the arithmetic means, one-way analysis of variance was used and Table (40).

Table 50: The results of the analysis of variance (One-way Anova) for the differences in the answers of the study sample due to age

variable	The source of the contrast	Total squares	DF Freedom degrees	Medium	The value of the calculated	The value of the tabular F.	Sig's morale level
the age	Between groups	3,106	4	621	5,280	3,92	1
	Inside groups	239,74	135	485			
	Total contrast	242,85	138				

It is clear from the results presented in the table (40) that the calculated value of F is (5,280) and its tabular value is (3.92). By comparing them, it is clear that the

calculated value of F is greater than the tabular value, and according to the decision rule that states that if the calculated F is greater than the tabular value of F, then This means "there are statistically significant differences at the level of significance (a≤0.05) in the estimates of the sample members due to (age), and this is confirmed by the level of significance (.001), which is less than 0.05. To determine the source of these differences, the Scheffe test was used Test.

Table 51: Scheffe test results for differences in responses due to age

Categories	Less than 25 years old	Less than 25 years old2	Less than 25 years old3	Less than 25 years old4	SMA
Less than 25 years old	-	0,55	0,50	0,57	3,717
25 - 30 years		-	0,41	0,49	3,741
31 - 40 years old			-	0,45	3,714
41-50 years				-	3,711

It is clear from the table (41) that there are differences between the results, as the differences tend in favor of the age variable (25-30).

4.2.3.5. Responses related to Reasons of Urban Expansion

1. Poor state control over agricultural areas

Table 52: Poor state control

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	120	60	20	50	50	300
Percentage	40%	20%	7%	16.5%	16.5%	100%

It is clear from above Table that the majority of the respondents chosen the option (fully agree), as this option has received a frequency of (125) and a percentage of (40%). This indicates that most of the sample participants hold the belief that there is a noticeable deficiency and lack of state oversight and control over agricultural areas. This

may be attributed to the inadequate measures taken by the state and its limited ability to enforce regulations and laws among the public. Consequently, many individuals have resorted to encroaching upon agricultural lands without considering the potential response from the authorities. The figure below illustrates the distribution of scores for the responses based on the provided alternatives.

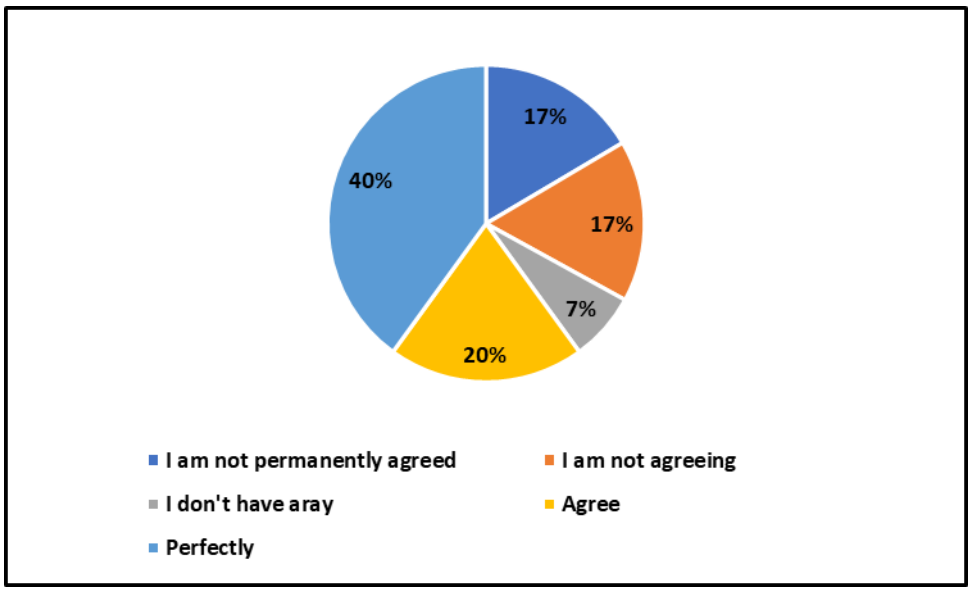


Figure 18: Response to poor state control

2. The population increase

Table 53: Population increase increased urban expansion

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	147	56	22	25	50	300
Percentage	49%	19%	7%	8%	16%	100%

Based on the above analysis, the researcher observes that the majority of the current research sample, comprising 49% of the respondents, have chosen the option "fully agree." This indicates that most participants believe that the increasing population in the capital, Baghdad, has resulted in population congestion. As a result, individuals

have resorted to encroaching upon agricultural areas, either by demolishing orchards on the outskirts of Baghdad or utilizing agricultural lands within the city center for housing purposes, in an attempt to capitalize on the demand for housing.

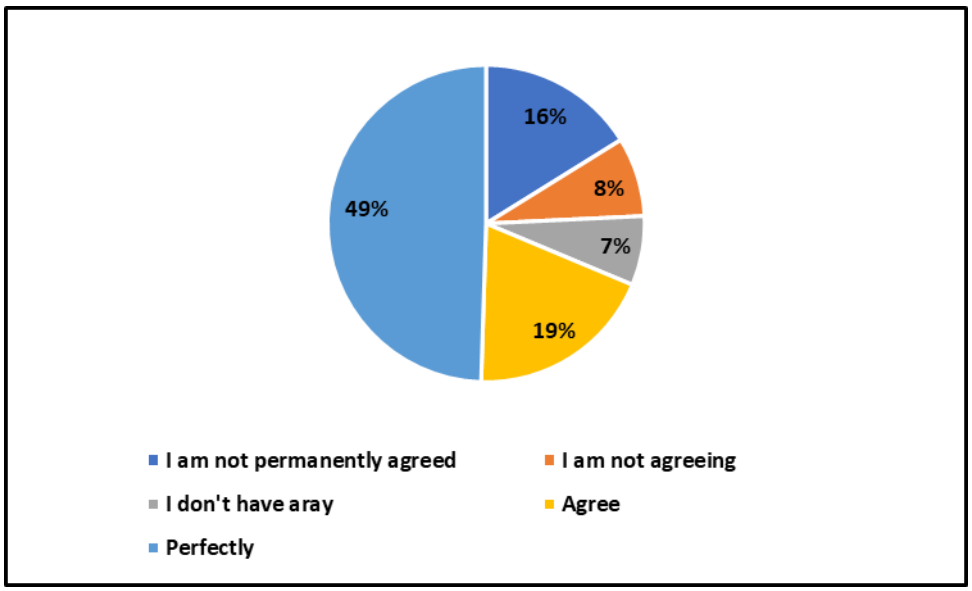


Figure 19: Responses to population increase

3. The greed of landowners and their desire to obtain money

Table 54: The landowners exploit the customers

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	67	136	26	31	40	300
Percentage	22%	45%	8%	10%	15%	100%

Based on the above analysis, the researcher concludes that the majority of the current research sample, comprising 45% (frequency 136) of the respondents, have chosen the option "agree." This indicates that most participants believe that workers in the agricultural real estate field aim to increase the prices and value of agricultural lands in order to attract a larger customer base and capitalize on the investment and sale of these lands, viewing them from a commercial perspective.

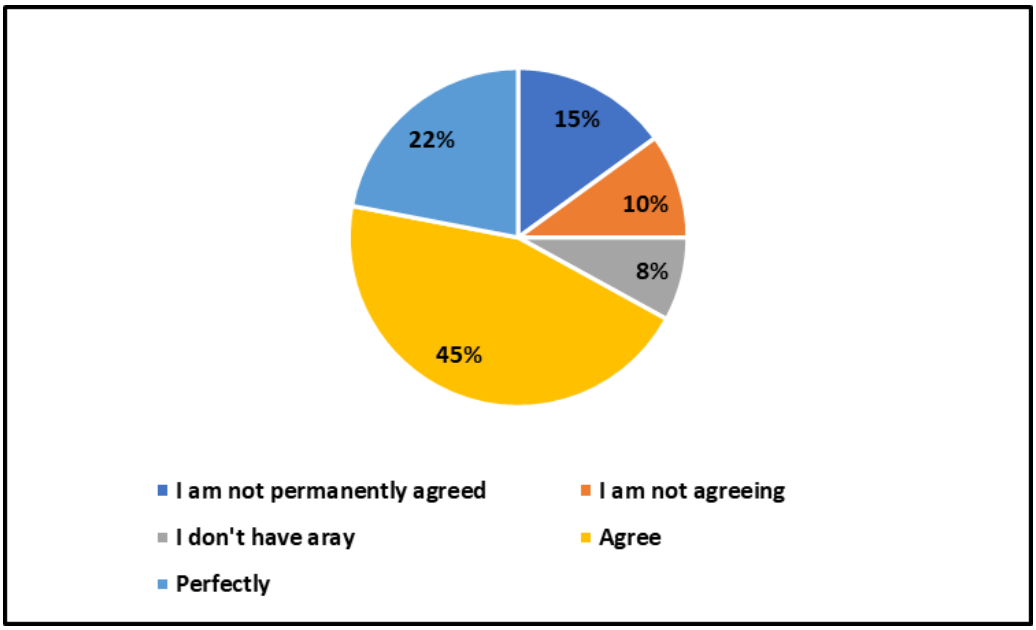


Figure 20: Respond of landowners and their desire to obtain money

4. High prices of owning lands (Tabu)

Table 55: High prices leads to urban expansion

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	155	60	22	23	40	300
Percentage	51%	20%	7%	7%	15%	100%

Based on the above analysis, the researcher concludes that the majority of the current research sample, comprising 51% of the respondents, have chosen the option "fully agree." This indicates that most participants believe that the continuous increase in the price of land ownership (Tabu), particularly in the center of the capital, Baghdad, coupled with the absence of clear control or standards for the high price of land in areas with inadequate public services such as electricity, sewage, and water, has led individuals to turn to cheaper lands as an alternative.

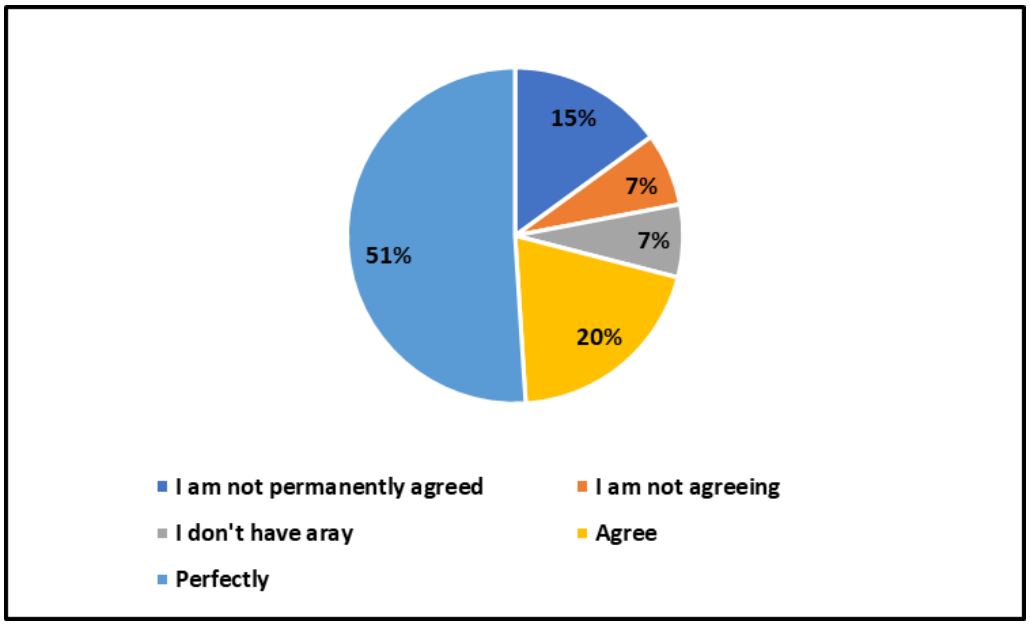


Figure 21: Responses to high prices leads to urban expansion

5-Poor economic resources of the community and the desire to obtain cheap housing

Table 56: Poor economic conditions lead to urban expansion

Options	Perfectly	Agree	I don't have a gray	I am not agreeing	I am not permanently agreed	the total
the number	127	82	33	31	30	300
Percentage	41%	27%	11%	11%	10	100%

Through the above, it is clear to the researcher that the majority of the current research sample has chosen the option (completely agree). This option has obtained a frequency of (124) and a percentage of (41%). This means that the majority of the sample believes that the weakness of the financial resources of individuals due to the Corona pandemic and the global crisis, as well as the turbulent conditions of the country for years, led to the poverty line being high and the middle class to be closer to the poor or to the middle class, all of these factors contributed to that the economic resources of individuals are weak, which clearly affected resorting to agricultural areas

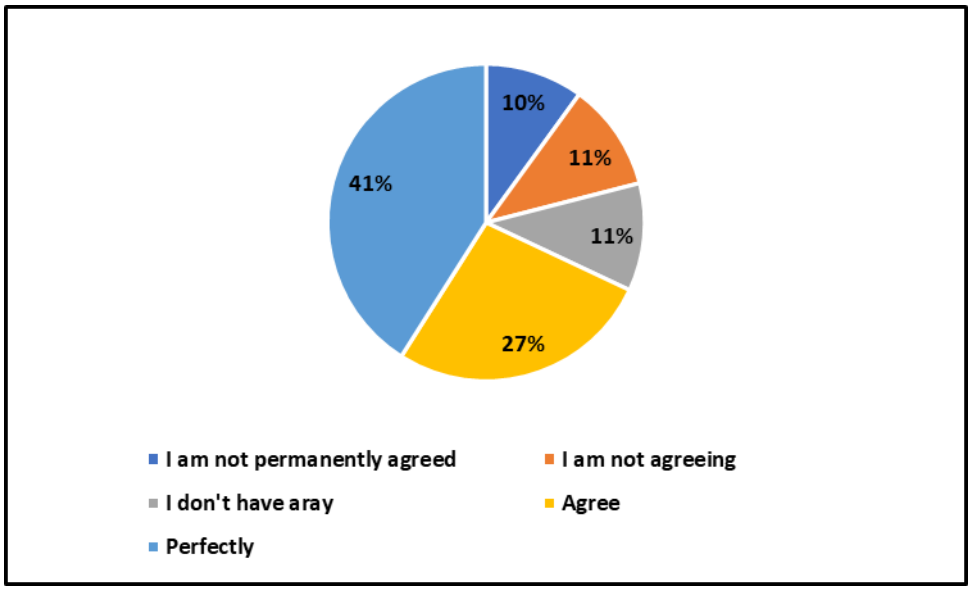


Figure 22: Responses to poor economic conditions leads to urban expansion

4.2.3.6. Responses related Mechanisms for dealing with urban expansion

1. Legislating a set of laws in order to control the reality of urban expansion

Table 57: Need of laws to control urban expansion

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	90	65	37	58	50	300
Percentage	30%	22%	13%	19%	16%	100%

Through the above, it is clear to the researcher that the majority of the current research sample has chosen the option (fully agree). This option has obtained a frequency of (90) and a percentage of (30%). This means that the majority of the sample believes that the most important mechanism that the state can follow in dealing with urban expansion at the expense of agricultural lands is the enactment of a set of laws to control the nature of expansion and its areas, as well as stopping the leveling of agricultural lands and establishing a legal officer to deal with it by the beneficiary individuals.

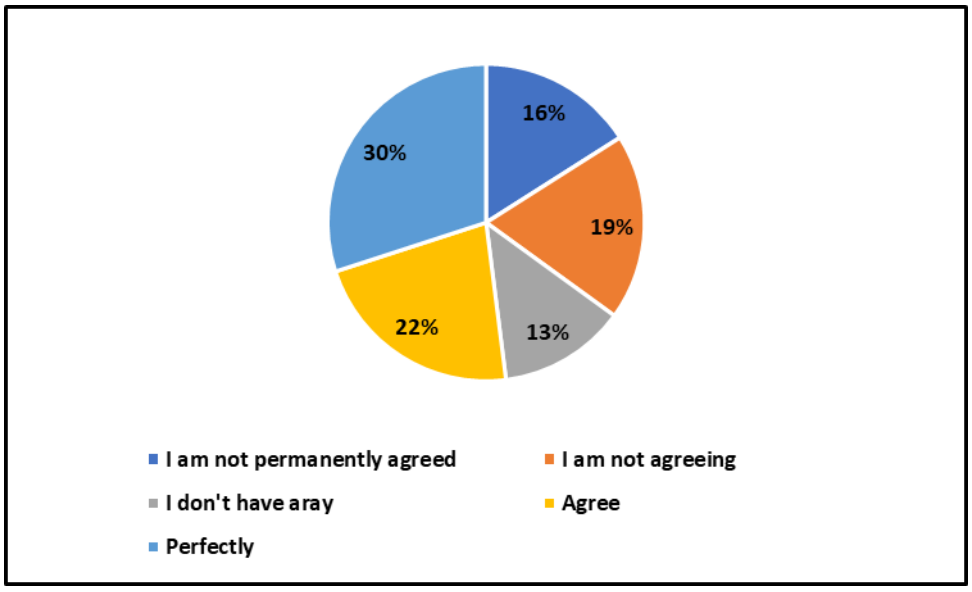


Figure 23: Responses to need of laws to control urban expansion

2. Increasing citizens' awareness of the need to investigate accuracy in dealing with urban expansion at the expense of agricultural lands.

Table 58: Need to increase citizens awareness

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	33	25	127	78		300
Percentage	12%	11%	8%	24%	37%	100%

Through the above, it is clear to the researcher that the majority of the current research sample has chosen the option (I do not agree), as this option has a frequency of (127) and a percentage of (42%).

Based on the analysis, it is evident that the majority of the sample holds the belief that resorting to educating citizens is ineffective. This is attributed to several reasons, the foremost being the weak trust between citizens and the government. Additionally, the motivation for turning to agricultural lands and engaging with them stems from limited economic resources. Consequently, advertising or public announcements have a

limited positive impact on raising citizens' awareness regarding the significance of green agricultural areas to the country.

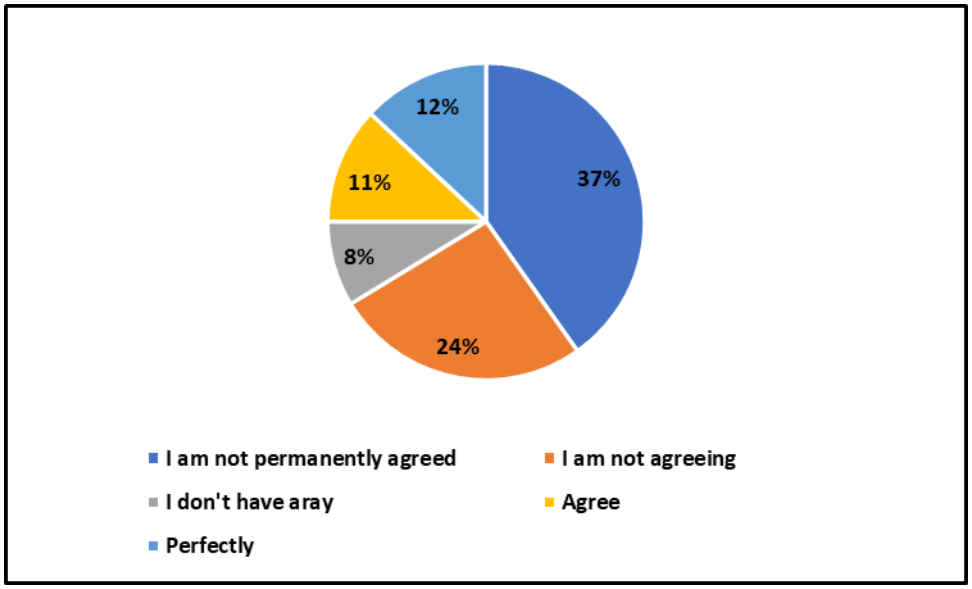


Figure 24: Responses to need to increase citizens awareness

3. It is possible for the state to resort to distributing lands to many groups free of charge in order to deal with the issue of urban expansion at the expense of agricultural lands in a more positive way.

Table 59: Government should make policies

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	137	87	37	19	20	300
Percentage	46%	29%	12%	6%	7%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (fully agree). This option got a frequency of (137) and a percentage of (46%). This means that the majority of the sample believes that the state's choice to resort to the distribution of land among the social groups will contribute primarily to

decreasing the value of agricultural real estate, and thus the weakness of resorting to it due to the existence of a continuous distribution of free plots of land.

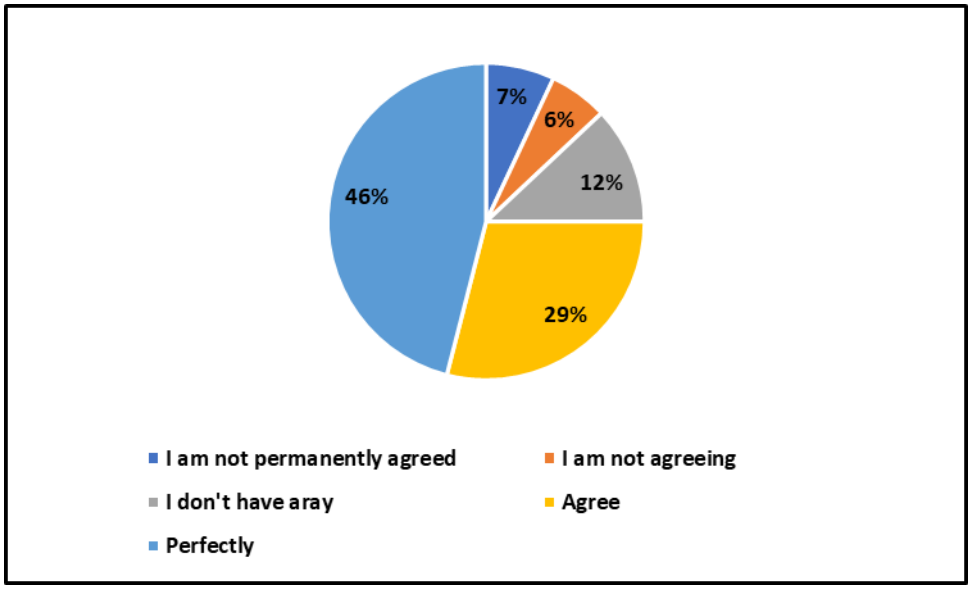


Figure 25: Responses to Government should make policies

4. The possibility of forming a community police to protect agricultural lands from urban expansion

Table 60: Need of community police to protect agricultural land

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	147	83	31	29	10	300
Percentage	46%	29%	12%	6%	7%	100%

It is clear from the previous table that the majority of the current research sample chose the option (perfectly agreed), as this option obtained afrequency of (147) and a percentage of (49%). This means that the majority of the sample believes that the formation of a combined police has a special to protect the green environment and green areas around or inside the capital, Baghdad, one of the solutions presented to deal with the urban expansion crisis at the expense of agricultural lands.

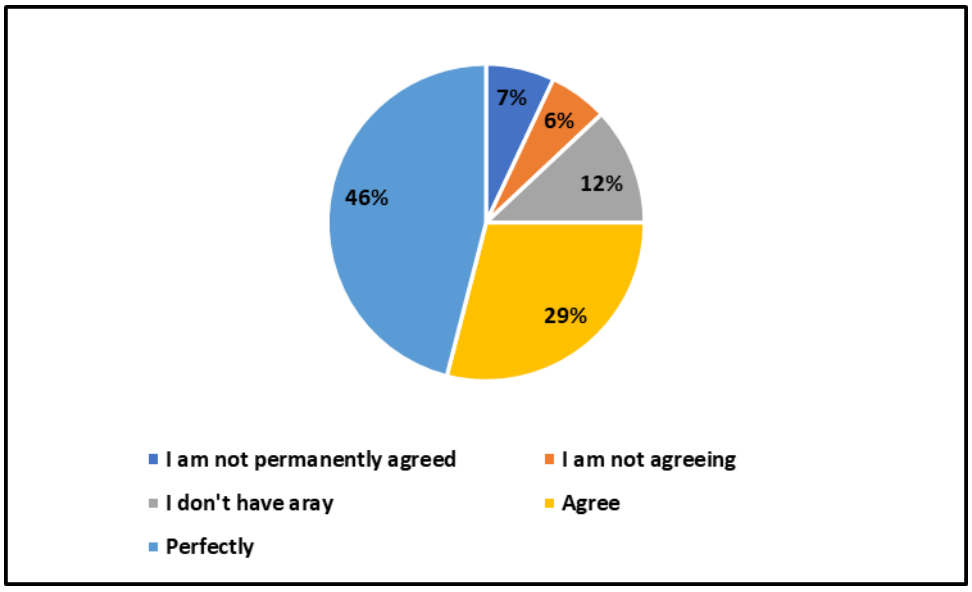


Figure 26: Responses to need of community police to protect agricultural land

5. The possibility of providing alternatives other than agricultural lands, such as vertical residential complexes, at competitive prices, and in installments over 20 years.

Table 61: Provision of alternative land other than agriculture

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	157	83	21	19	20	300
Percentage	52%	27%	7%	7%	7%	100%

It is clear from previous table that the majority of the current research sample chose the option (perfectly agreed), as this option obtained a frequency of (152) and a percentage of (52%). This means that the majority of the sample believes that the state's direction towards the vertical construction by preparing residential complexes at symbolic prices and over a period of (20) years, it can contribute to dealing with the issue of urban expansion at the expense of agricultural lands more positively.

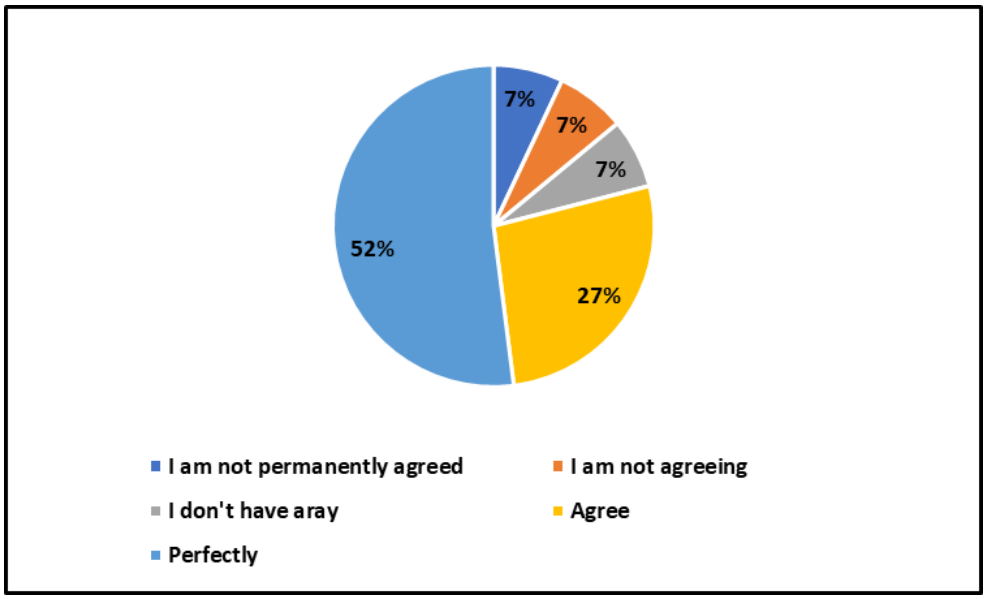


Figure 27: Responses to provision of alternative land other than agriculture

4.2.3.7. Pearson correlation coefficient/The Efficiency of Services

First educational services.

6. The necessity of determining the number of schools for different age groups for each housing neighborhood built.

7. The need for urban expansion to accompany the use of technology in construction and design in relation to schools and good employment of school buildings

8. The possibility of exploiting the empty spaces in building scientific complexes (a group of schools for multiple age groups) in the same place in order to facilitate the process of material and service communication for the total of these schools at the same time

9. The need to pay attention to urban expansion in relation to schools by employing Japanese designs in the field of buildings in a manner consistent with the weather

10. It is possible to rely on the vertical construction in the construction of schools to shorten the available spaces

4.2.3.8. Responses related Efficiency of Educational Services

1. The necessity of determining the number of schools for different age groups for each housing neighborhood built.

Table 62: Need for more schools

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	142	89	27	22	20	300
Percentage	47%	30%	9%	7%	7%	100%

It is clear from the above table that the majority of the current research sample chose the option (completely agree), as this option has received a frequency of (147) and a percentage of (47%). This means that the majority of the sample believes that determining the number of schools (primary-medium-middle) for each residential building on agricultural land in order to ensure the achievement of a kind of educational efficiency for the population and this is one of the conditions for investing agricultural lands.

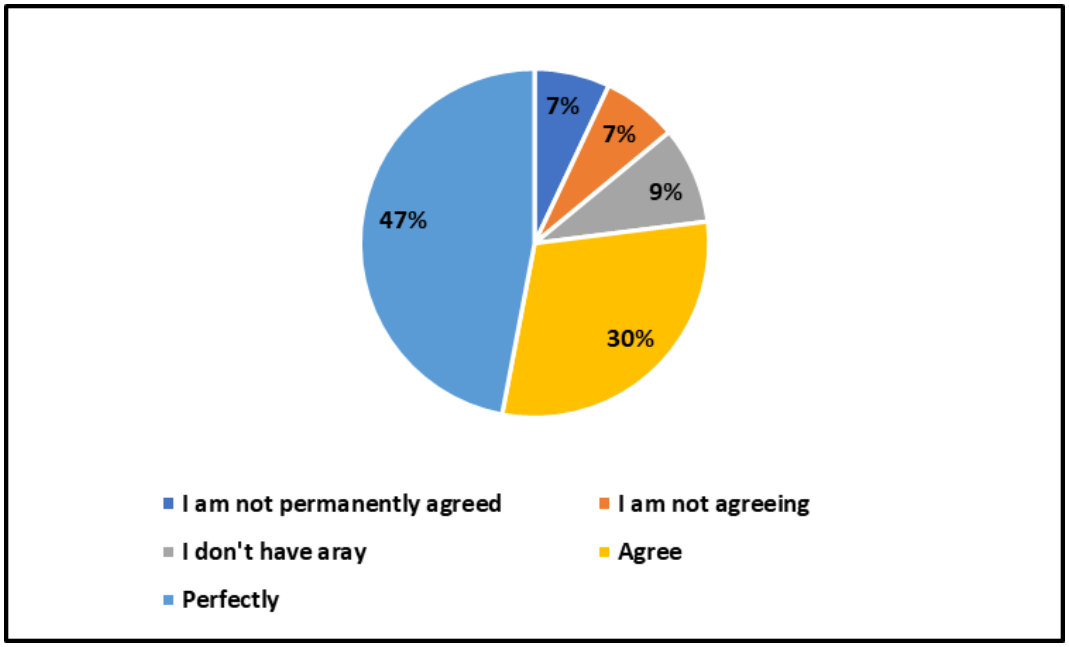


Figure 28: Responses to need for more schools

2. The need for urban expansion to accompany the use of technology in construction and design in relation to schools and good employment of school buildings.

Table 63: Use of technology

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	135	74	16	25	50	300
Percentage	45%	25%	5%	8%	17%	100%

It is clear from above table that the majority of the current research sample chose the option (perfectly agreed), as this option obtained a frequency of (135) and a percentage of (45%). This means that most of the sample believes that the introduction of modern technology in the field of building buildings is very important in order to ensure the exploitation of the available resources better, as well as the possibility of absorbing the largest number of good areas and thus achieves educational efficiency for the buildings built in a contemporary manner.

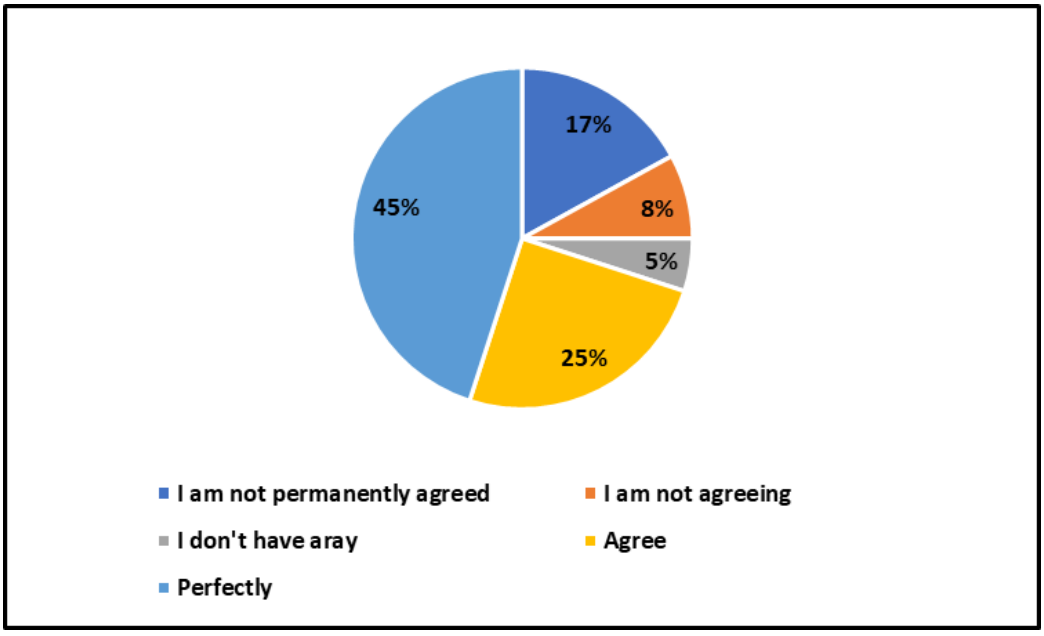


Figure 29: Responses to use of technology

3. The possibility of exploiting the empty spaces in building scientific complexes (a group of schools for multiple age groups) in the same place in order to facilitate the process of material and service communication for the total of these schools at the same time.

Table 64: Need for multiple Buildings

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	108	78	17	50	47	300
Percentage	36%	26%	6%	17%	15%	100%

It is clear from previous table that the majority of the current research sample chose the option (completely option), as this option has received a frequency of (108) and a percentage of (36%). This means that the majority of the sample believes that the possibility of building a column and collecting a multiple group of schools (elementary and secondary) can be one for the ease of work of buildings and the exploitation of spaces, and this is possible in many countries for easy achievement on the one hand and to use the spaces better

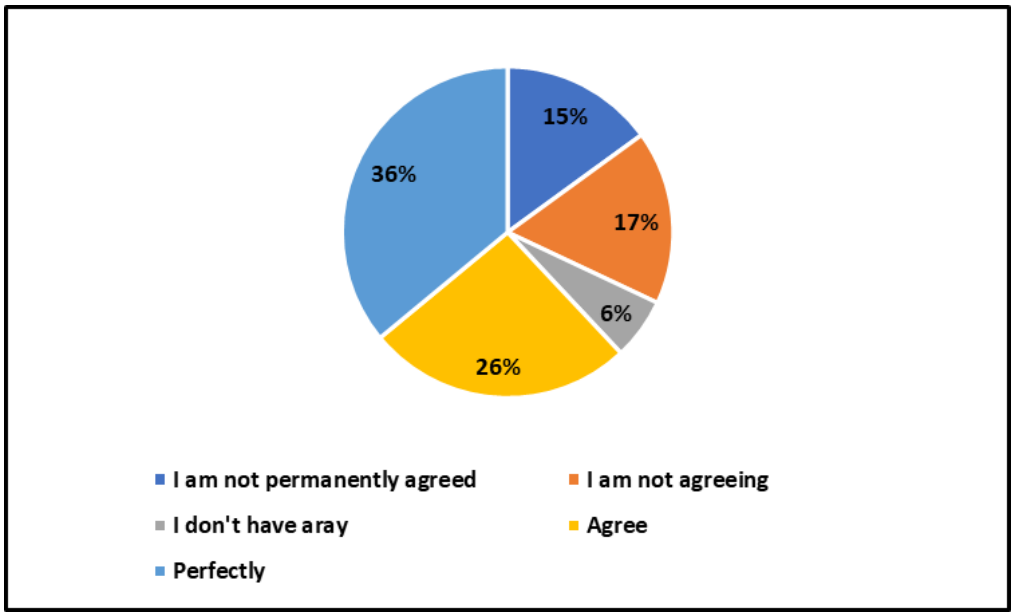


Figure 30: Responses to need for multiple Buildings

4. The need to pay attention to urban expansion in relation to schools by employing Japanese designs in the field of buildings in a manner consistent with the weather.

Table 65: Need to build Japanese design buildings

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	149	85	17	19	30	300
Percentage	49%	28%	6%	6%	11%	100%

It is clear from previous table that the majority of the current research sample chose the option (perfectly agreed), as this option obtained a frequency of (149) and a percentage of (49%). This means that the majority of the sample believes that the possibility is that it is possible to use and employ the Japanese experience in relation to educational efficiency while taking into account the material and scientific differences between both countries, meaning adapting the Japanese experience in line with the Iraqi experience.

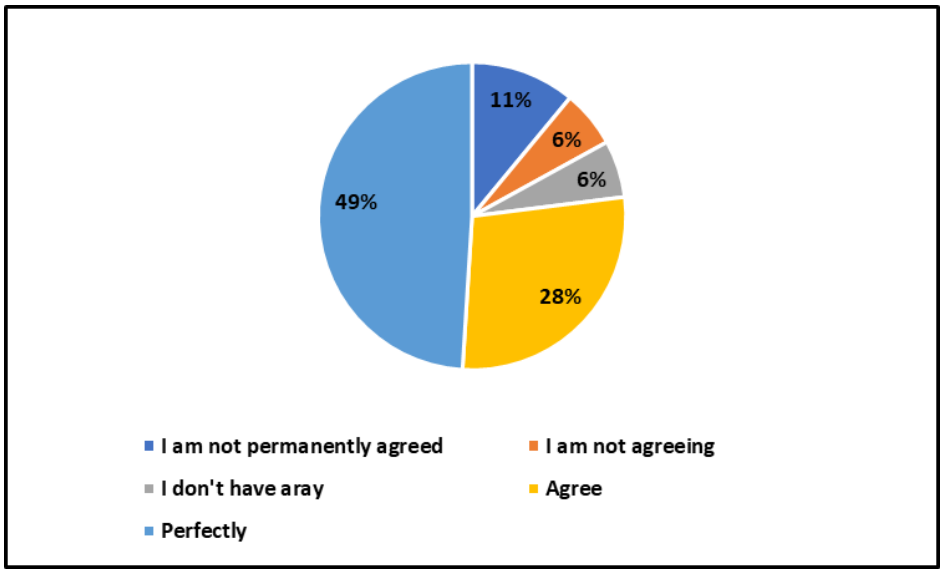


Figure 31: Responses to need to build Japanese design buildings

5. It is possible to rely on the vertical construction in the construction of schools to shorten the available spaces.

Table 66: Need vertical construction

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	115	76	21	32	56	300
Percentage	38%	25%	7%	11%	19%	100%

It is clear from previous table that the majority of the current research sample chose the option (completely option), as this option has received a frequency of (115) and a percentage of (38%). This means that the majority of the sample believes that vertical construction may be appropriate at the present time in order to achieve the maximum possible number of school buildings in green areas for a solution to the current crisis.

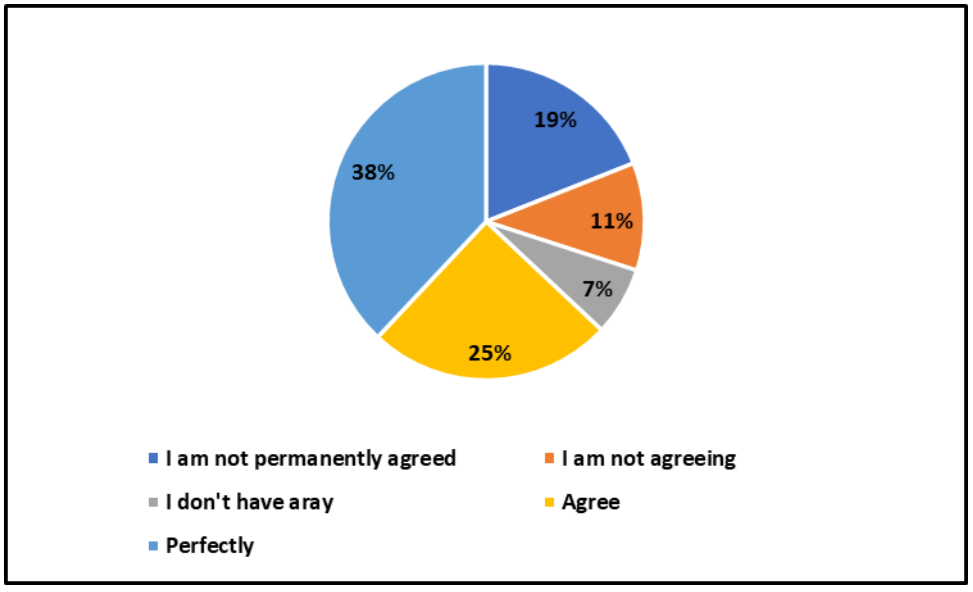


Figure 32: Responses to need vertical construction

4.2.3.9. The field of health services

1. Employing some international health services models in Baghdad in order to be in line with the urban expansion.

Table 67: International health model required

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	158	83	10	19	30	300
Percentage	53%	28%	3%	6%	10%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (completely agree), as this option has obtained a frequency of (158) and a percentage of (53%). This means that the majority of the sample believes that it is necessary to adopt global models in the field of health services in order to comply with the nature of the population momentum in relation to the urban expansion in agricultural areas

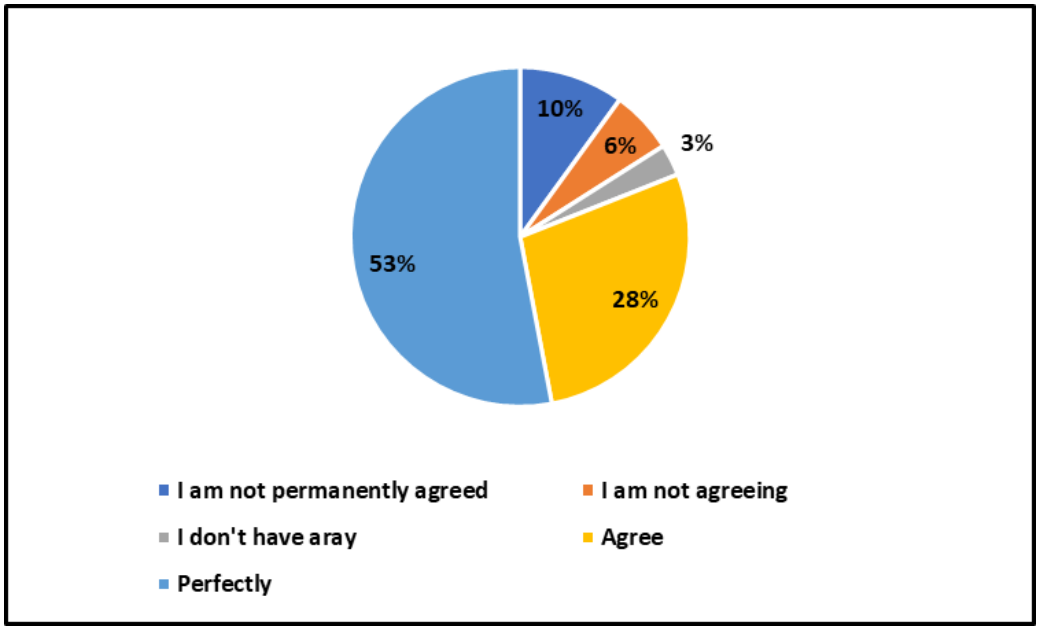


Figure 33: Responses to international health model required

2. The need to ensure the contracting of more advanced medical devices to confront the rampant diseases as a result of urban expansion and the rise of the population.

Table 68: Need for more advanced equipment

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	158	83	10	19	30	300
Percentage	53%	28%	3%	6%	10%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (completely agree). This option has obtained a frequency of (158) and a percentage of (53%), and this means that the majority of the sample considers that it is necessary to contract the purchase of equipment A more developed nature in order to face the many diseases as a result of overcrowding in agricultural areas.

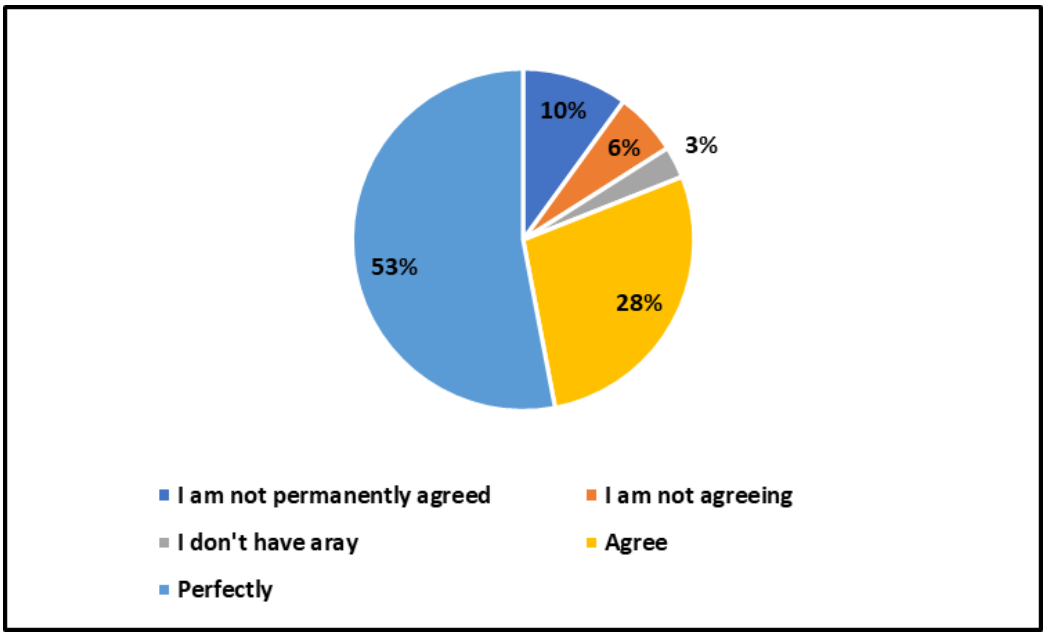


Figure 34: Responses to need for more advanced equipment

3. It is possible to rely on some abandoned or neglected buildings and convert them into hospitals as quick solutions for the rapid urban expansion.

Table 69: Need to use abandon buildings

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	148	89	22	21	20	300
Percentage	49%	30%	7%	7%	7%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (completely agree).This option has obtained a frequency of (148) and a percentage of (49%), and this means that the majority of the sample believes that it is possible to employ a lot of buildings Neglected giant markets (such as the central markets in Baghdad) in order to convert them into hospitals, with the need to pay attention to their reconstruction and provide them with appropriate medical equipment.

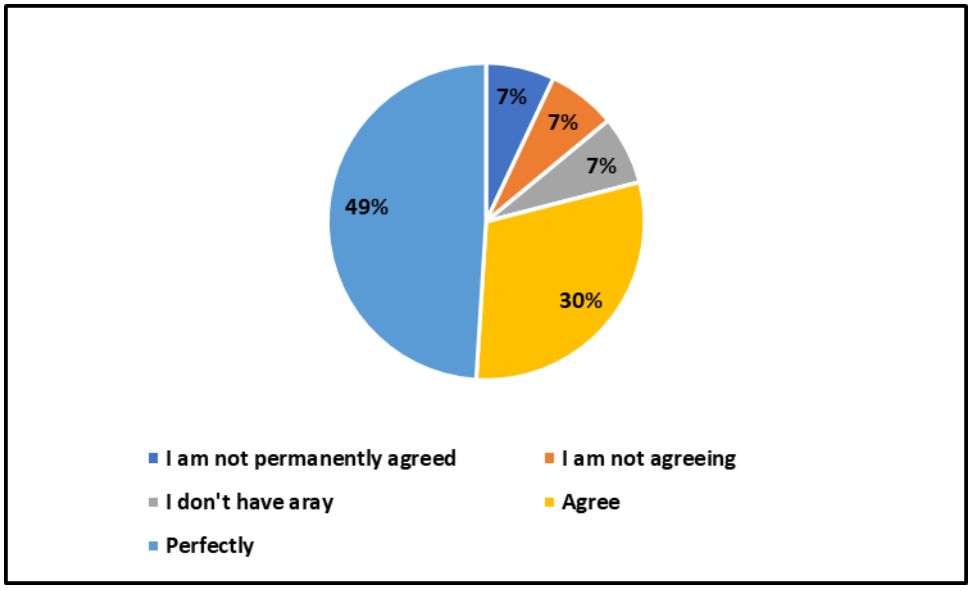


Figure 35: Responses to need to use abandon buildings

4-The importance of focusing on missions and scientific cultural exchange between Iraq and the countries of the developed world in the field of health and its services. Urban expansion does not only include physical buildings, but necessarily includes reason and culture.

Table 70: Need of exchange of health facilities internationally

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	178	76	3	23	20	300
Percentage	59%	25%	1%	7%	8%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (fully agree). This option has obtained a frequency of (178) and a percentage of (59%), and this means that the majority of the sample considers it necessary to focus on scientific exchange and cultural relations with the countries of the world, with interest in missions outside the country in order to achieve a good level of efficiency in health services through the development of natural and working cadres in the field of health.

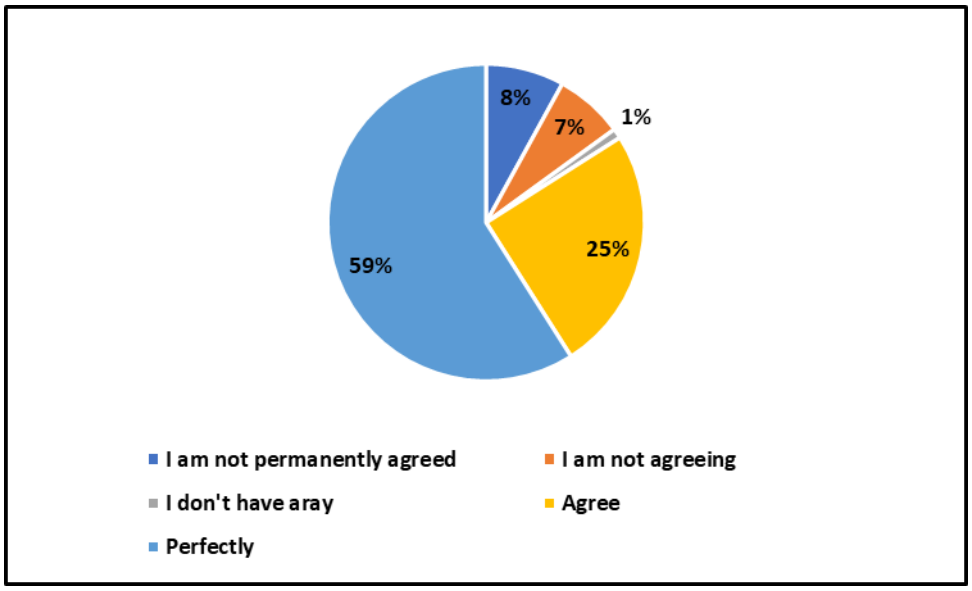


Figure 36: Responses to need of exchange of health facilities internationally

5. The importance of following up on the medical departments and their belongings in private universities and colleges, as well as emphasizing the criteria for accepting admission to such colleges, given their danger to the health service in the future.

Table 71: Importance of private colleges

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	146	94	19	31	40	300
Percentage	49%	21%	6%	10%	14%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (fully agree). This option has obtained a frequency of (146) and a percentage of (49%), and this means that the majority of the sample believes that it is necessary to follow up on private colleges with regard to It is linked to the medical departments and their outputs, as they pose a threat to the efficiency of health services if the quality of their outputs is not focused. Therefore, permits for medical departments and departments close to them in private colleges must be followed up.

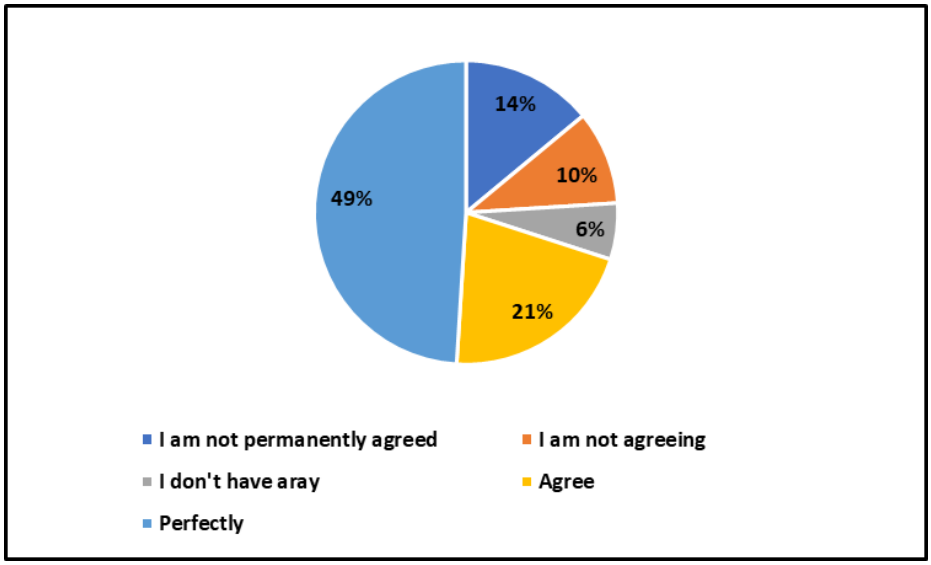


Figure 37: Responses to importance of private colleges

4.2.3.10. Responses related to Efficiency in Transportation

1. Paying attention to modern transportation such as (the metro) and rapid land transportation methods organized to regulate traffic.

Table 72: Need of modern transportation

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	137	89	17	17	40	300
Percentage	45%	30%	6%	6%	13%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (completely agree). This option has obtained a frequency of (137) and a percentage of (45%), and this means that the majority of the sample believes that the movement of transport in agricultural areas Which benefited from urban expansion is weak and crowded, so it is necessary to pay attention to modern transportation methods such as metro, trains, and others.

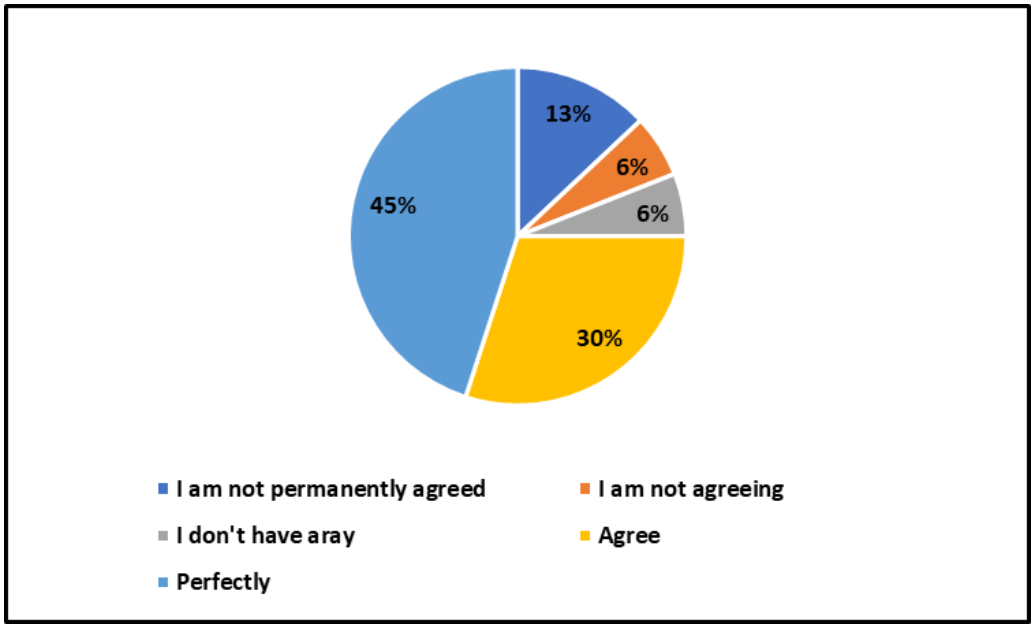


Figure 38: Responses to need of modern transportation

2. Seek to reduce the severity of irrigated bottlenecks by working with the system (falling).

Table 73: Need to improve vehicles

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	127	89	25	19	40	300
Percentage	42%	30%	9%	6%	17%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (fully agree). This option has obtained a frequency of (127) and a percentage of (42%), and this means that the majority of the sample considers it necessary to adopt the system of projection from in order to reduce the number of vehicles operating on the streets as well as to impose progressive fines on old vehicles

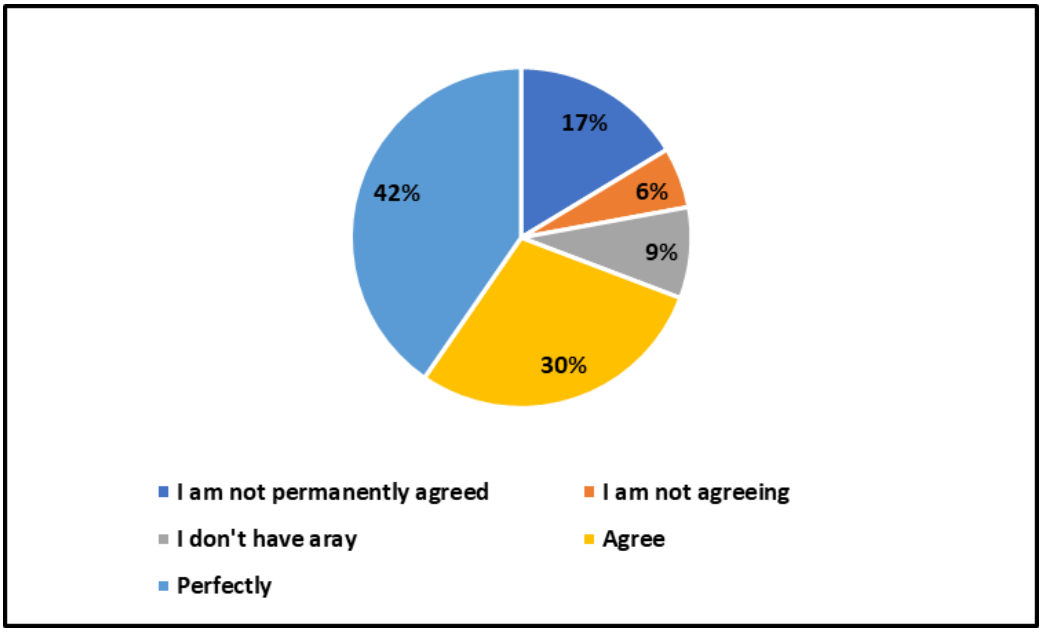


Figure 39: Responses to need to improve vehicles

3. Paying attention to widening roads and building bridges and side streets in order to accommodate urban expansion.

Table 74: Need more wide roads

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	127	95	17	31	30	300
Percentage	42%	32%	6%	10%	10%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (completely agree). This option has obtained a frequency of (127) and a percentage of (42%), and this means that the majority of the sample believes that it is necessary to expand bridges and streets with Taking into account the development of secondary streets in order to accommodate new streets and branches

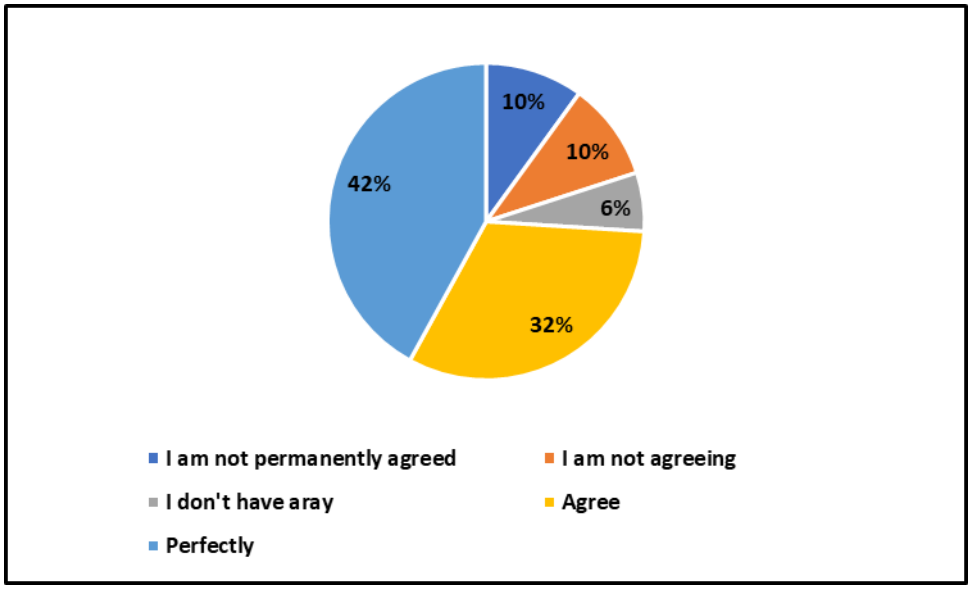


Figure 40: Responses to need more wide roads

4. Adopting a monitoring system through cameras in order to monitor traffic violations in order to create awareness of the traffic culture for pedestrians and vehicle owners.

Table 75: Need to adopt monitoring system

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	138	83	22	17	40	300
Percentage	46%	28%	7%	6%	13%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (totally agree).

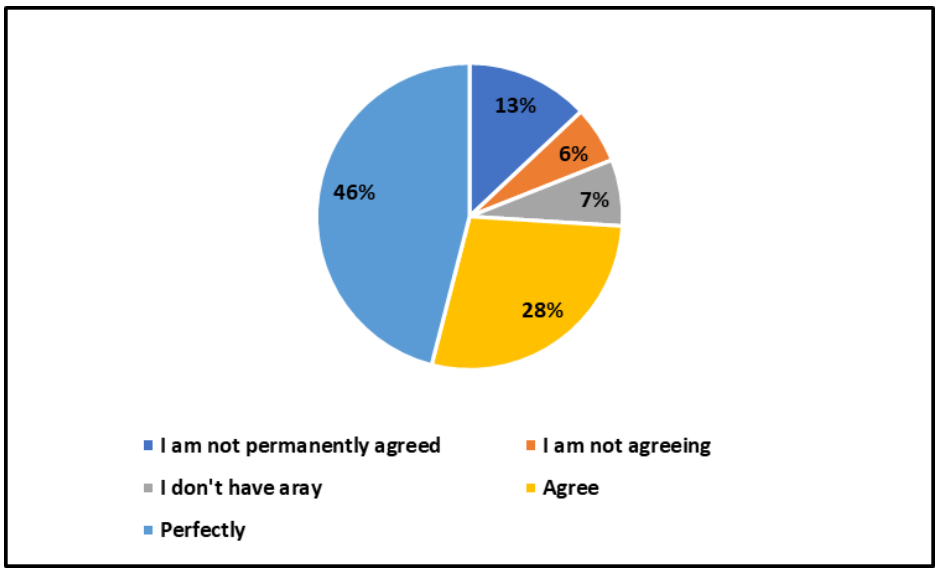


Figure 41: Responses to need to adopt monitoring system

5. Activating the role of the Ministry of Transport in government public transport and providing safe and fast means of transport, as it is one of the preferred modes of transport for individuals.

Table 76: Need to improve government role

Options	Perfectly	Agree	I don't have aray	I am not agreeing	I am not permanently agreed	the total
the number	159	74	22	25	20	300
Percentage	53%	25%	7%	8%	7%	100%

It is clear from previous table that the majority of the current research sample has chosen the option (fully agree). This option has obtained a frequency of (159) and a percentage of (53%), and this means that the majority of the sample considers it necessary to adopt a public transportation strategy Especially at the level of employee lines and workers through public transportation, where public buses can easily solve the transportation crisis.

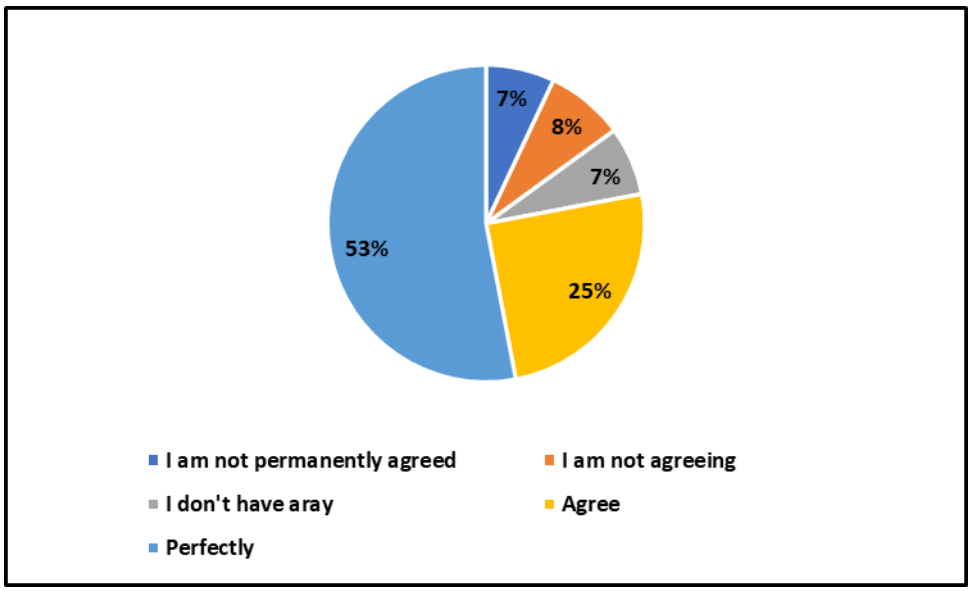


Figure 42: Responses to need to improve government role

1. There is a clear deficiency and weakness of the state in monitoring and controlling agricultural areas. This matter may be due to the weakness of the state's procedures and its ability to impose its control and laws on the general public, so many resorted to encroaching on agricultural areas without calculating the state's reaction.

2. Individuals resort to agricultural areas due to the continuous growth of the population, resulting in overcrowding in the capital city of Baghdad. This population

pressure has led individuals to demolish orchards located on the outskirts of Baghdad or convert agricultural areas within the city into housing investments.

3. Those working in the field of agricultural real estate seek to raise the prices and value of agricultural lands in the hope of attracting the largest possible number of customers to invest and sell these lands and raise their value from a commercial point of view.

4. The continuous increase in land prices, particularly in the central areas of Baghdad, along with the absence of clear regulations or standards for determining land prices, coupled with inadequate public services like electricity, sewage, and water, has driven individuals to opt for land that is relatively cheaper compared to Tabu (official land ownership documentation).

5. The financial resources of individuals have been weakened due to the impact of the COVID-19 pandemic and the global crisis, as well as the turbulent conditions that the country has been facing for years. As a result, the poverty line has risen, and the middle class has become closer to the poor class rather than the middle class. These factors have contributed to the overall weakening of economic resources for individuals, which has had a clear impact on their resorting to agricultural areas.

6. The most crucial mechanism that the state can adopt to address urban expansion encroaching on agricultural lands is the implementation of a comprehensive set of laws that regulate the nature and extent of such expansion. This includes measures to prohibit the indiscriminate leveling of agricultural lands and establishing legal controls to govern the actions of individuals benefitting from these lands. By enacting and enforcing such laws, the state can effectively manage urban growth while safeguarding the vital agricultural resources.

7. The option of relying solely on citizen education may be deemed ineffective for various reasons. One significant factor is the existing lack of trust between citizens and the government. Additionally, the motivation behind resorting to agricultural lands and engaging in such practices is primarily driven by economic constraints rather than a lack of awareness. Consequently, traditional methods such as publicity or advertising campaigns might not have a substantial impact on raising citizens' awareness regarding the significance of green agricultural areas and their contribution to the country.

8. The state's choice to resort to distributing lands to the social groups will contribute primarily to decreasing the value of agricultural real estate, and thus the weakness of resorting to it due to the existence of a continuous distribution of free plots of land.

9. The mechanism of forming combined police for the protection of the green environment and green spaces around or within the capital, Baghdad, is one of the solutions proposed to deal with the urban expansion crisis at the expense of agricultural lands.

10. The state's orientation towards vertical construction through the preparation of residential complexes at nominal prices over a period of (20) years may contribute to dealing with the issue of urban expansion at the expense of agricultural lands in a more positive way.

11. Determining the number of schools (primary-intermediate-preparatory) for each residential building on agricultural land to ensure the achievement of a kind of educational efficiency for the population. This is one of the conditions for investing agricultural lands.

12. The introduction of modern technology in the field of preparing buildings is very important to ensure better utilization of the available resources, as well as the possibility of accommodating the largest number with good spaces, and thus achieving educational efficiency for buildings constructed in a contemporary way.

13. There is a possibility of constructing a centralized facility that houses multiple schools, including primary and secondary levels. This approach is adopted in various countries to streamline the construction process and optimize space utilization. By consolidating schools into a single location, it becomes easier to manage and maintain the facilities. Additionally, shared resources and infrastructure can be efficiently utilized, resulting in cost savings and improved efficiency. .

14. There is a possibility of learning from the Japanese experience in educational efficiency and adapting it to the Iraqi context, considering the material and scientific differences between the two countries. While it may not be feasible to replicate the Japanese education system exactly, valuable insights and best practices can be drawn from their approach. Vertical construction may be appropriate at the present time in

order to achieve the maximum possible number of school buildings in green spaces as a solution to the current crisis.

15. It is necessary to adopt global models in the field of health services in order to comply with the nature of the population momentum in relation to urban expansion in agricultural areas.

16. It is necessary to contract the purchase of more advanced medical equipment in order to face the many diseases as a result of overcrowding in agricultural areas.It is possible to utilize large, neglected buildings, such as the central markets in Baghdad, by repurposing them into hospitals. These buildings would require renovation and refurbishment to meet the necessary standards and infrastructure for a healthcare facility. This includes ensuring proper ventilation, electrical systems, plumbing, and other essential requirements for a hospital environment.

17. It is necessary to focus on scientific and cultural exchange with countries of the world, with interest in missions outside the country in order to achieve a good level of efficiency in health services through the development of natural and working cadres in the field of health.

18. It is necessary to follow up on private colleges with regard to medical departments and their outputs, as they pose a threat to the efficiency of health services if focus is not placed on the quality of their outputs. Therefore, permits for medical departments and departments close to them in private colleges must be followed up.

19. The transportation movement in agricultural areas that have benefited from urban expansion is weak and crowded, so attention must be paid to modern transportation methods such as the metro, trains, and others.

20. It is necessary to adopt the anticipation system in order to reduce the number of vehicles operating in the streets, in addition to imposing progressive fines on old vehicles.

21. It is necessary to widen bridges and streets, taking into account the development of secondary streets in order to accommodate new streets and branches.

22. It is necessary to adopt a monitoring system for streets and roads in order to apply the law to violators or to monitor theft and assaults on others on public roads, bearing in mind that this system is in force in the countries of the world.

23. It is necessary to adopt a public transportation strategy, especially at the level of employees and workers lines through public transportation, as public buses can solve the transportation crisis easily.

24. There are statistically significant differences at the level of significance ($a \leq 0.05$) in the estimates of the respondents of the impact of urban expansion on services due to (sex) and in favor of males

25. There are statistically significant differences at the level of significance ($a \leq 0.05$) in the estimates of the respondents for the impact of urban expansion on services due to (educational qualification), in favor of Ph.D.

26. There are statistically significant differences at the level of significance ($a \leq 0.05$) in the estimates of the respondents of the impact of urban expansion on services due to (years of experience) and in favor of the category (10) years and over

27. There are statistically significant differences at the level of significance ($a \leq 0.05$) in the estimates of the respondents of the impact of urban expansion on services due to (age) and the benefit of the category (25-30)

5. CONCLUSION AND RECOMMENDATIONS

The study aims to achieve the general objective of examining urban expansion in the study area and identifying the current expansion axes by utilizing modern technologies to study and monitor urban expansion in Baghdad. It seeks to identify future expansion axes and monitor and measure urban expansion in the study area through data sensing. Additionally, the study will conduct a comprehensive inventory and geographical survey of the primary service centers in the city, focusing on their number, distribution, and efficiency. It will also develop maps for the expansion axes based on future proposals using modern technologies, with the purpose of enhancing service efficiency, ensuring adequate distribution, and promoting fairness in the study area.

Furthermore, the study aims to determine the directions of urban expansion axes in the capital city of Baghdad to address issues such as the encroachment on fertile agricultural lands, economic problems, and environmental damage caused by this expansion. The objective is to guide the expansion directions based on scientific planning principles, promoting axial and radial expansion in suitable open areas while avoiding encroachment on orchards and productive palm trees. These areas symbolize the environmental and economic wealth of the province.

The main problem arises from the rapid urbanization rate and the challenge of controlling the city's expansion due to migration, population growth, and the significant increase in population in major urban centers of Baghdad Governorate, particularly in Dora, Karrada, Kadhimiya, and Zayona. This population increase is not solely attributed to the urban revolution or the general increase in the region and country's urban population. Instead, it is mainly driven by the improvement in the overall economic situation since 2003, leading to an enhanced standard of living for the population during that period and up to the present day.

The study utilized an analytical approach to uncover the state of services in the study area through field research and the distribution of questionnaires in residential neighborhoods. This approach aimed to gather the necessary data and information for the study, enabling the development of planned policies to enhance service efficiency in line with future urban expansion. Additionally, the study employed a descriptive

approach by analyzing available data, local studies, and relevant sources from both Arab and foreign origins.

The structure of the study was designed to align with the identified problems, hypotheses, and objectives. The thesis consisted of four research chapters, preceded by a summary, table of contents, tables, maps, figures, and visuals. The introduction to the research followed, providing an overview of the study, its problem statement, scientific hypotheses, objectives, methodology, justifications, sample selection methods, review of previous studies, and clarification of concepts and terminology. The chapter also addressed the study area's boundaries, location, and developmental factors.

The second chapter focused on the theoretical framework related to the urban system, urbanization, and urban expansion. It briefly discussed modern technologies utilized in the study, such as remote sensing, the global signature system, and geographic information systems. The second part of this chapter delved into the nature of social, health, educational, and transportation services, providing detailed information about each aspect. The third chapter encompassed a spatial analysis of urban expansion in the study area, along with prospects, and examined its impact on basic services using geographic information systems technology. Regarding the fourth and final chapter, it serves as a summary and discussion, emphasizing the conclusions and recommendations derived from the study's theoretical and practical components.

The most important results we achieved can be summarized as follows. The city of Baghdad suffers from many environmental problems because of its growth and increase in its spatial size and the expansion of its territory at the expense of the agricultural lands surrounding its borders. The urban expansion accompanying the rapid population increase is one of the main causes of the housing problem. Residential neighborhoods randomly without observing the most basic technical and health rules, and this caused the loss of large areas of agricultural land, which left negative effects, foremost of which is the decline in agricultural production and the destruction of large areas of arable land as well as environmental deterioration and high rates of pollution, and to achieve urban environmental balance - Rural, the matter requires a careful study of all natural, demographic, economic and social environmental factors, and this requires proper planning and rational investment of natural resources that aims at optimal investment of the land and stopping urban sprawl.

The Baghdad governorate witnessed a deficit in the number of hospitals amounting to (69) hospitals, and with the exception of (Al-Rusafa district), which has a surplus in the number of hospitals amounting to (17) hospitals, all the districts of the research area record a deficit in the number of hospitals in varying degrees, and (Adhamiya district) was recorded The highest amount of disability was (17) hospitals, while the least disability was (2) two hospitals, and that was in (Al-Tarmiya district). Less than the rest of the districts. Regarding the number of health centers, the entire Baghdad governorate faces a shortage of (1334) health centers. When examining the districts individually, it is evident that all of them experience a deficit, although the extent varies. The Rusafa district has the highest deficit, with (301) health centers, while the Al-Tarmiyah district has the lowest deficit, with only (21) health centers. This pattern can be attributed to the same factors that contribute to the district's lower deficit in terms of the number of hospitals.

Similarly, the situation regarding popular medical clinics in Baghdad governorate shows a deficit. The total deficit in the number of popular medical clinics across the governorate amounts to (750) clinics. Among the districts, the Rusafa district has the highest deficit, with (168) clinics, while the Tarmiya district has the lowest deficit, with only (15) medical clinics. This indicates a shortage of popular medical clinics throughout the governorate, with varying degrees of severity in different districts. The overall situation regarding the number of beds in Baghdad governorate indicates a deficit of (6012) beds. However, the Rusafa district is the only district that witnessed a surplus of (1649) beds. On the other hand, all the remaining districts experienced a deficit in the number of beds, ranging from the highest to the lowest deficit in the districts of Al-Adhamiya, Al-Karkh, Al-Kadhimiya, Al-Mahmudiyah, Al-Sadr Al-Awwal, Al-Madain, Abu Ghraib, Al-Sadr Al-Second, and Al-Tarmiyah. The deficits in these districts amount to (1911, 9252, 880, 871, 863, 668, 509, 450, 456) beds, respectively. This indicates an insufficient number of beds to meet the healthcare needs of the population in these districts, except for the Rusafa district, which has a surplus.

According to the planning criterion, there is a surplus of doctors in Baghdad governorate amounting to (5399) doctors. At the district level, eight districts have a surplus in the number of doctors, listed from the highest to the lowest surplus: Al-Rusafa, Karkh, Kadhimiya, Adhamiya, Abu Ghraib, Al-Sadr Al-First, Al-Mahmudiyah, and Al-Sadr Al-Second. The number of surplus doctors in these districts is as follows: (2163,

1920, 865, 201, 128, 127, 70, 58) physicians, respectively. On the other hand, the districts of Madaen and Tarmiyah experience a deficit in the number of doctors, with a shortage of (113, 18) doctors, respectively.The highest rates of educational services were recorded in the district (Baghdad Al-Jadida, Al-Mamoun, Al-Fahama, Al-Mansour) with rates of (20.6%, 12.3%, 6.4%, 4.4%), and it decreased in Al-Abaiji by (0.3%). The rate of student/teacher distribution in the governorate was (20.3), the rate increased in M, Q Al-Kadhimiya at a rate of (39) and was lower in Al-Abaiji at a rate of (9) students/teacher.

The governorate average for a student / class was (38.0), it increased in Al-Wahda sub-district (63), and it decreased in Al-Mansour (34) students / class. The governorate recorded an average of (553) students/schools, which increased in Al-Mamoun at a rate of (9849 students/schools) and decreased in Al-Abaiji (223) students/schools. The number of college schools in the governorate is (4217), of which (3370) are the original schools and (847) are guest schools. The percentage of primary schools is (79.9%) and the percentage of guest schools is (20.1%). The percentage of primary schools is urban (69.2%) and rural (30.8%), while guest schools recorded an increase in urban areas (67.6%). 4%, and the countryside.(%32.6)

The number of kindergartens in Baghdad governorate is reported to be 330. The highest increase in the number of kindergartens was observed in the following administrative units: Al-Ma'mun, Al-Mansur, Baghdad Al-Jadida, Al-Karkh, Al-Karrada Al-Sharqiya, and Al-Adhamiya, with the respective numbers of kindergartens being 41, 38, 27, 26, 24, and 23. However, there was a decrease in the number of kindergartens in the administrative district that includes rural areas, which includes Al-Yousifiyah, Al-Latifiya, Al-Rashid, Abu Ghraib, Al-Madaen, and the location of Rawdat Wehda, where only one kindergarten was reported. The province also included four universities. The number of university graduates increased in the University of Baghdad by (45.6%), followed by Al-Mustansiriya by (32.9%), while it decreased in Al-Nahrain University by (2.9%) and the University of Technology. .(%5.7)

The city of Baghdad witnessed significant growth, as its population size doubled for the period 1977-2012, accompanied by the expansion of the built-up area of the city by 3.5 times for the same period, which led to the exacerbation of urban problems, including traffic and transportation. The city serves a diverse network of streets and

paths, with an estimated length of 3521 km, but it is unable to serve the city's population efficiently, with an index of 1 km of roads serving 1,667 individuals and an index of 4.2 km of roads serving 1 km2 of the built-up area of the city in 2012.The transportation and traffic problems in the city were exacerbated by various indicators, including the large increase in the number of vehicles, as there were 1.2 million vehicles in the city in 2012, except for government vehicles, 21.3 thousand registered motorcycles, in addition to the problem of discrepancy and heterogeneity of traffic due to the diversity vehicles.

The city suffers from road accidents that exceed a thousand recorded annually for the period 2010-2012. These accidents cause losses to lives and vehicles. The average rate of road deaths is 20%, injuries 73%, and damages 6.4% of the total number of accidents annually. The city suffers from a weakness in public transport, which started in the mid-nineties of the last century and was built after 2003. The number of operating buses was estimated at 300 in 2012, transporting 9.8 million annually for the period 2009-2012. The problem of transportation and traffic has become acute now, and the various measures, such as the rehabilitation of some streets and roads, the construction of bridges and tunnels, the transfer of some parking lots, could not mitigate this problem, so it requires the adoption of efficient approaches and policies to address the problem. Addressing the problem of transportation and traffic in the city requires the adoption of efficient approaches and policies based on scientific studies and surveys and the implementation of projects, plans and programs to comprehensively address the problem within the location of the city and its surrounding areas.

1 .Re-planning of rural and urban settlement in a way that guarantees the distribution of settlements in orders of magnitude commensurate with the requirements of providing the services needed by the population, in order to reduce economic costs and ensure a suitable environment for human settlement away from random and unregulated growth.

2 .Urban sprawl at the expense of agricultural lands is a phenomenon that loses the policy of agricultural expansion, and the solution to this problem requires defining the directions of urban expansion in a precise and firm manner, while not expanding them, whatever the circumstances, and enacting laws that categorically prohibit the establishment of various projects on agricultural lands, and the concentration of such projects Within the range of lands unsuitable for agricultural investment.

3. Redistributing residential lands in a scientific manner and for the state to enter as an investor or work to support and encourage the private sector to invest in this field and to encourage vertical construction at costs commensurate with economic conditions, taking into account the reality of society and its environmental conditions.

4 .The need to provide an Environmental Information Systems (ELS) database that includes detailed and comprehensive information on the nature of natural resources as well as the current and future population situation on the grounds that the population represents the second party in the environmental planning system, and this base should include data and information on the population in terms of their number, Their size, population growth rate, geographical distribution and density, with future population projections for the purpose of determining the required land areas in the future.

5 .Carrying out future studies to organize the current and possible lands of the study area, observing changes, addressing urban problems and proposing solutions, as well as following up on plans, programs and recommendations related to land uses and choosing the optimal and sustainable use.

6. The need to move towards a balance in the provision of services between the districts of Baghdad governorate in order to address the deficit or the gap occurring in them, and to address the disparity in their performance, in order to reassure the population's need for such vital services.

7 .There is an urgent need to build new schools in the study area, as most schools are witnessing a large overcrowding of students in their academic divisions, in addition to the transformation of most of them from the previously known single shifts to double and triple shifts, meaning that one school building includes more than one school.

8 .The large size of the population in the Baghdad governorate requires the establishment of hospitals and health centers commensurate with this size, especially in some of the districts that are most incapable of preparing hospitals and the various health services provided to their residents. In addition to the need to provide enough doctors in the districts located on the outskirts of Baghdad Governorate.

9. It is better to monitor data related to the population, their characteristics and various activities, as well as the services provided to them and others, at the level of the smallest administrative units into which the governorates are divided; With the aim of

achieving development plans at a high level of accuracy and efficiency, as much of the data currently available is at the level of large administrative units (provinces in some of them or districts at best).

10 .The necessity of directing towards a balance in the provision of services between the districts of Baghdad governorate in order to address disparity and reduce social disparities among the population.

11 .The need to conduct scientific and comprehensive studies and surveys by specialized research centers in the bodies and agencies responsible for transport and traffic in the city of Baghdad, so that these studies are linked to the activities and uses of land in the city's regions.

12 .Efficient implementation of proposals and plans for the metro system and the application of sizing policies and restructuring the city of Baghdad to address the current and future transportation and traffic problems in order to achieve the building of a balanced and satisfactory transportation system.

13 .Adopting multiple procedures and programs to address the problem, such as road maintenance, traffic control and control, separation of types of traffic according to types of vehicles and speed ranges, enforcement of traffic laws and legislation.

14. The importance of effective coordination and cooperation between the authorities and those concerned with transportation and traffic by a central authority for transportation and the need for public participation in order to improve conditions for movement in Baghdad.

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LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

APPENDICES

Appendix 1:

Questionnaire

1- Gender: Male ☐ Female ☐

2- Age: Less than 25 years old ☐ 25-30 years ☐ 31-40 years ☐ 41-50 years ☐

3- Educational Qualification: Bachelor's☐ Master's☐ Ph.D ☐

4- Professional Experience: Less than 5 years ( ) 5-10 years ( ) 10 or more ( )

Causes of urban expansion

N	In your opinion, what are the causes of urban expansion in Baghdad?	Totally agree	agree	I have no opinion	I don't agree	I don't Agree at all
1-	Poor state control over agricultural areas					
2-	The population is increase					
3-	The greed of landowners and their desire to obtain money					
4-	High prices of owning lands (Tabu)					
5-	Poor economic resources of the community and the desire to obtain cheap housing					

The efficiency of educational services

N	In your opinion, what are the effects of urban expansion on the efficiency of educational services?	Totally agree	agree	I have no opinion	I don't agree	I don't Agree at all
6-	The necessity of determining the number of schools for different age groups for each housing neighborhood built					
7-	The need for urban expansion to accompany the use of technology in construction and design in					

	relation to schools and good employment of school buildings					
8-	The possibility of exploiting the empty spaces in building scientific complexes (a group of schools for multiple age groups) in the same place in order to facilitate the process of material and service communication for the total of these schools at the same time					
9-	The need to pay attention to urban expansion in relation to schools by employing Japanese designs in the field of buildings in a manner consistent with the weather					
10-	It is possible to rely on the vertical construction in the construction of schools to shorten the available spaces.					

The efficiency of health services

N	**In your opinion, what are the effects of urban expansion on the efficiency of health services?**	**Totally agree**	**agree**	**I have no opinion**	**I don't agree**	**I don't Agree at all**
11-	Employing some international health services models in Baghdad in order to be in line with the urban expansion					
12-	The need to ensure the contracting of more advanced medical devices to confront the rampant diseases as a result of urban expansion and the rise of the population					
13-	It is possible to rely on some abandoned or neglected buildings and convert them into hospitals as quick solutions for the rapid urban expansion					
14-	The importance of focusing on missions and scientific cultural exchange between Iraq and the countries of the developed world in the field of health and its services. Urban expansion does not only include physical buildings, but necessarily includes reason and culture.					
15-	The importance of following up on the medical departments and their belongings in private universities and colleges, as well as emphasizing the criteria for accepting admission to such colleges, given their danger to the health service in the future.					

The efficiency of transportation services

N	In your opinion, what are the effects of urban expansion on the efficiency of transport services?	Totally agree	agree	I have no opinion	I don't agree	I don't Agree at all
16-	Paying attention to modern transportation such as (the metro) and rapid land transportation methods organized to regulate traffic					
17-	Seek to reduce the severity of irrigated bottlenecks by working with the system (falling)					
18-	Paying attention to widening roads and building bridges and side streets in order to accommodate urban expansion					
19-	Adopting a monitoring system through cameras in order to monitor traffic violations in order to create awareness of the traffic culture for pedestrians and vehicle owners.					
20-	Activating the role of the Ministry of Transport in government public transport and providing safe and fast means of transport, as it is one of the preferred modes of transport for individuals					

CURRICULUM VITAE

Liqaa Mahdi OBAID is an accomplished academic in the field of geography. He completed his secondary education in Baghdad, Iraq, and obtained a Bachelor's Degree in Geography from the University of Baghdad, with a specialization in the Ibn al-Rushd Education Department. Subsequently, he pursued advanced studies, obtaining a Master's Degree in Geography from Karabuk University in Turkey.

Liqaa's academic journey has endowed him with a robust foundation in geographical concepts, research methodologies, and analytical skills. He is deeply committed to furthering his academic pursuits and contributing to the discipline of geography through rigorous research and practical applications.