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Spatial Analysis Of The Economic Composition Of The Population Of Al-Hashimiyah District In Babil Governorate

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Abstract: This study aims to analyze the economic structure of the population in Al-Hashimiyah District from a geographical perspective, by identifying the primary economic activities practiced by residents and examining their spatial distribution patterns, as well as the natural and human factors influencing this distribution. The study relied on official statistical data issued by the Central Bureau of Statistics and the Ministry of Agriculture, as well as the use of spatial analysis tools to monitor variations in economic activity patterns within the district.

The results revealed that agricultural activity forms the backbone of the local economy in terms of workforce size. This is attributed to the availability of agricultural resources such as fertile soil and water, particularly in the southern and eastern parts of the district. This is followed in importance by the industrial sector, which is characterized by the spread of small and medium-sized industrial activities, often concentrated near main roads and raw material sources; however, their distribution was found to be geographically imbalanced.

Spatial analysis also revealed clear disparities in the economic structure among different areas within the district, due to variations in natural factors such as water and soil, and human factors including education levels, infrastructure availability, and employment opportunities. The study further indicated that the lack of strategic planning and weak investment have limited the diversity and sustainability of economic activities. This highlights the need for the development of balanced policies based on accurate spatial databases that take into account the environmental and social characteristics of each area within the district.

Introduction: Chapter One

Theoretical Framework of the Research

Introduction

The topic of the economic structure of the population has received significant attention from researchers in various disciplines. Studying it provides insight into the most prominent features of the economic structure of any society and the importance of this structure. It also provides a clear understanding of employment, the characteristics of the labor force, and the degree of change in this structure based on changes in the size of the workforce according to different economic sectors. The study of spatial variations in the economic characteristics of the population also reflects demographic, cultural, and social differences, as well as the steps taken by regions to achieve human and economic development. The economic structure of the population is a necessary basis for developing plans (for the future, whether in economic development projects or in the fields of public services, etc.).

First: The Research Problem:

The following question represented the research problem: (Is there an economic structure for the Hashemite District?)

It attempts to answer the following questions:

1. How does the labor force vary among the residents of the Hashemite District?

2. Is there variation in the demographic characteristics of the labor force in the Hashemite District?

3. Is there variation in the labor force by sector in the Hashemite District? 4- Is there unemployment among the workforce of the Hashemite District residents?

Second: Research Hypothesis:

The researcher assumes that the economic structure in Al-Hashimiya District is linked to differences in demographic, financial, and social variables.

The secondary hypotheses are as follows:

1. The population distribution of the labor force is characterized by variance and variations in Al-Hashimiya District.

2. There is a disparity in the demographic characteristics of the labor force in Al-Hashimiya District.

3. The size of the labor force varies according to the economic sectors in Al-Hashimiya District.

4. The study area suffers from the problem of unemployment, coinciding with a high percentage of graduates.

Third: Research Objectives: This research seeks to achieve several objectives, the most important of which are:

1. Monitoring the changes that have occurred in the size and growth of the labor force in Al-Hashimiya District.

2. Shedding light on the geographical distribution and density of the economically active population.

3. Studying the qualitative gap in the labor force in detail, tracking the changes that have occurred at the central, rural, urban, and sub-district levels.

4. Analyzing indicators by which the extent of Contribution of the labor force to economic activity is measured.

5. To determine the extent of the Contribution of different age groups to economic activity.

Fourth: Spatial Boundaries:

The study area lies between latitudes (38 44 - 40 44 East) and latitudes (20 32 - 23 32 North). The city of Hashimiyah is a district within Babil Governorate, and its administrative boundaries include four sub-districts. It is bordered to the north by Al-Madhiyah District, to the east by Al-Shomali and Al-Qasim Sub-districts, to the south by Al-Qasim Sub-district, and to the west by Hillah District. The city is characterized by reciprocal spatial connections with neighboring units, particularly given its location in the middle of an agricultural and pastoral region within the floodplain. The Hillah River crosses it, a tributary of the Euphrates River, which extends approximately 5.1 kilometers within the city's municipal boundaries. ( ).

The area is bordered to the north by Al-Mahawel District, to the west by Hillah District, to the south by Najaf Governorate, to the southeast by Diwaniyah Governorate, and to the east by Wasit Governorate. The study area covers an area of 2,266 km2, representing 4.39% of the governorate's total area (Map 1). The study area includes four administrative units: the districts of Al-Qasim, Al-Madhatiyah, Al-Shumli, and Al-Tali'ah, in addition to the district center. Data from the Central Bureau of Statistics, included in the results of the 1997 General Population Census, were relied upon because they are more accurate than population estimates for subsequent years.

Map (1) Geographical location of the study area

Source: Republic of Iraq, Ministry of Water, General Directorate, Administrative Maps of Babil Governorate, 2022.

Source: Republic of Iraq, General Directorate of Survey, Administrative Map of Iraq, 1:1,000,000 drawing, 2022.

Section Two: The Natural and Human Geographical Characteristics of Al-Hashimiya District:

First: The Natural Characteristics of Al-Hashimiya District:

Natural characteristics play a significant role in economic activity, as well as in the distribution of population and its variation from one place to another. Humans play a crucial role in scientific and technological progress, and therefore, efforts are made to mitigate the negative impacts of these disciplines. These characteristics also include multiple elements whose impact varies from one place to another, including surface, climate characteristics, soil, and water resources:

1- Surface:

The study area is part of an alluvial plain, characterized by its flat surface and low slope. The topographic map shows that the contour line, representing an elevation of 26 meters above sea level, passes through the northwestern parts of the region. In comparison, the contour line of 20 meters extends through the southern parts. It is noticeable that the lines of equal elevation often run parallel to the course of the Hillah River towards the southeast, indicating that the lands near the river are higher than those farther from it. This slight decline has been reflected in the population distribution, as the population is concentrated on the edges of the floodplains adjacent to the Hillah River and its branching streams. This has led to the emergence of villages and major cities in the relatively elevated areas of the floodplain. The surface of the study area can be divided into several distinct topographical units, which will be discussed in detail later, as follows:

A. River shoulders area:

This is the most extensive area in the study area, spanning from the far northwest to the southeast. The river's area of the shoulders is characterized by its elevation compared to the surrounding lands. These areas are characterized by low groundwater levels and natural drainage, with soils having a coarse to medium-fine texture. Therefore, it is one of the most critical sections of the floodplain from an agricultural perspective, as agricultural land, such as fruit and vegetable orchards, is widespread. B - River Basin Area (River Plains):

River basin areas are approximately 2-3 meters lower than river shoulder areas and extend across geographic depressions far from river courses and their branching streams. These areas are composed of sediments brought by floodwaters and deposited far from river courses. These areas comprise most of the study area in the southeastern and western parts of the Shatt al-Hillah River, and are helpful for agricultural uses.

C - Shallow Lowlands (Marshes and Swamps):

These are initially swamps and marshes, some of which are permanent and some are seasonal. They are small depressions that appear in the south of the study area,

specifically in the southern part of the Al-Tali'ah district. These areas are characterized by low surface areas and high groundwater levels, which have led to poor drainage. The most commonly grown crop is rice.

D - Hills:

They are widespread features that extend in the form of long, high hills that do not exceed 5.6 m in height and extend for a distance of more than 5-8 km. These hills resulted from the sediments of the southeastern winds when they blow, carrying dust, and are not suitable for agriculture, and appear devoid of vegetation cover. The hill lands appear in all parts of the district, such as (Tall Abu Zarqa, Al-Khamisat, Imam Rashid, Abu Jadoua, Abu Azam, Aithan Akbar, Imam Aoun, Imam Al-Abraq, Tal Al-Saud) in Al-Madhatiya and (Tall Al-Marjaniya, Umm Al-Nakhila, Talul Al-Jabsa, Al-Alawiya Al-Sharifa, Imam Ahmed Al-Saffah) in Al-Qasim and (Tall Zurna Al-Kabir, Al-Mansouriya, Abu Daryaash) in Al-Tali'a. C - Dunes:

Dunes are spread over the river basins, located to the southeast of the district and extending to Wasit Governorate. They represent the surface presence of the floodplain and take the form of long extensions or scattered dunes. They appear in both the Shomali and Madhatiyah districts in the form of transverse or crescent-shaped bars, resulting from the blowing of winds laden with southeastern sand. The shape of the crescent-shaped dune follows the direction of the northwesterly winds, which support its edges extending southeastward. Its shape changes with the change in the blowing of the southeasterly winds. These areas are unsuitable for agricultural land use due to the sandy soil.

2. Climatic factors:

This is one of the most prominent natural factors influencing agricultural land use in the governorate, including the study area. It largely determines the types of crops and determines the areas that can be grown with certain crops, excluding other crops, and the resulting spatial relationships between agricultural land use. The following is a study of the most critical climatic elements influencing the study area:

A. Solar radiation:

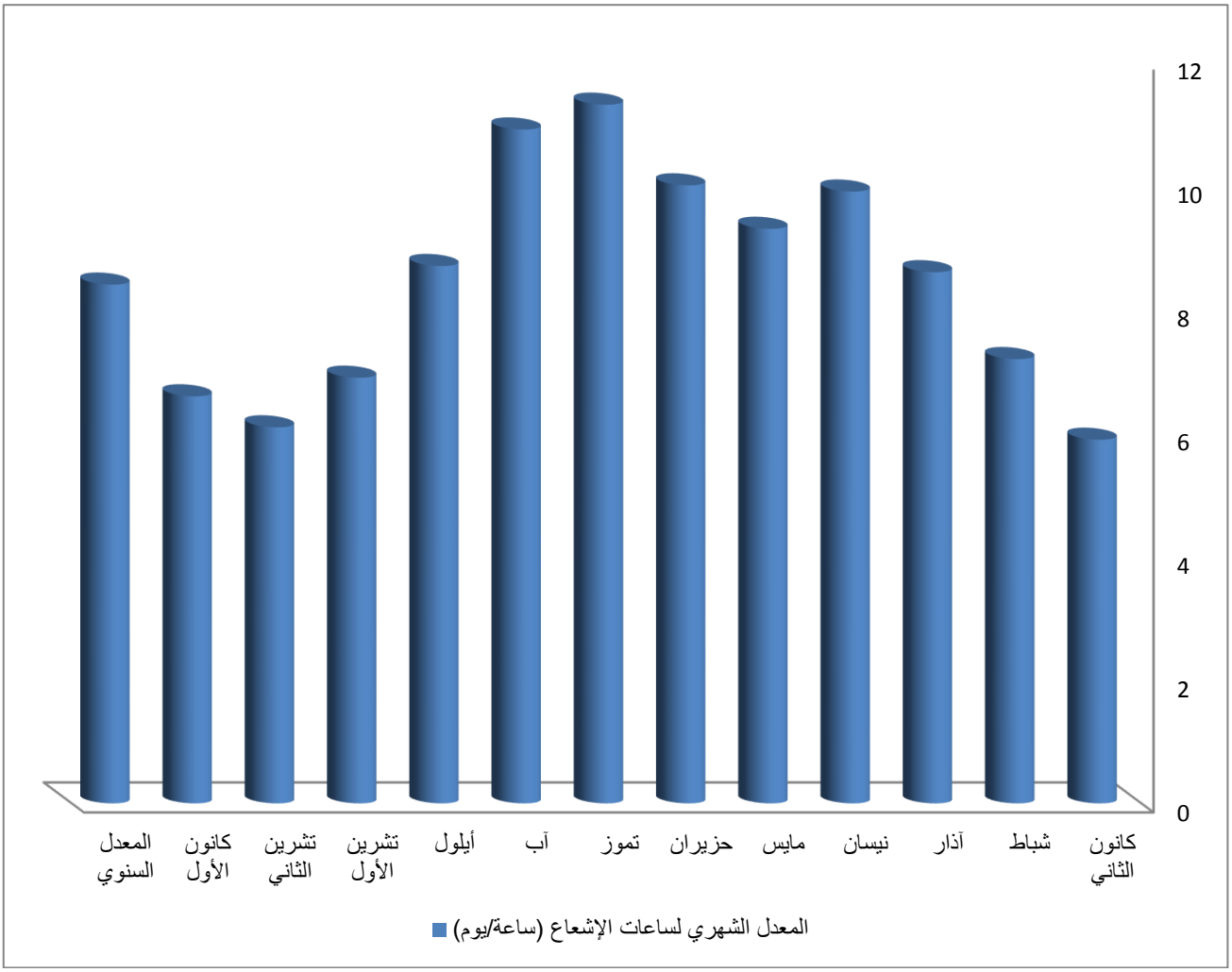
Table (1) and Figure (1) show that the annual average of sunshine hours reached 8.4 hours per day. It is noted that the highest average of sunshine hours occurred in July and August, with July reaching 11.3 hours per day. As for August, we note that it began to increase starting in June, when it recorded 0.10 hours per day, and continued to rise until it reached its highest point in July, during the summer season. This is due to the length of the day and the clearness of the evening. This, in turn, leads to an increase in temperatures, which then impacts other climatic elements and, ultimately, land use.

Table (1) Monthly average of climate elements at Al-Hillah station for the period from 1992 to 2022

Humidity %	Wind m/s	Monthly rainfall average/mm	Normal temperatures (°C)	Monthly average radiation hours (hours/day)	Month
64	2.4	35.1	10.2	5.9	January
54	2.4	22.5	13	7.2	February
46	2.1	8.2	17.4	8.6	March
35	2.4	7.2	23.6	9.9	April
28	2.4	5	29.3	9.3	May
25	3	0	33.2	10	June
22	2.8	0	35.2	11.3	July
27	2.1	0.01	34.7	10.9	August
30	1.4	0	30.9	8.7	September
27	1.6	3.6	25.2	6.9	October
71	1.2	25.2	16.7	6.1	November
69	2.1	31.5	11.8	6.6	December
41.5	2.1	138.31	23.4	8.4	Annual Average

Source: Republic of Iraq, Ministry of Transport, General Authority for Meteorology and Seismic Monitoring, Climate Department, unpublished data, 2022.

Figure (1) Graphic representation of the monthly average hours of solar radiation (hours/day)



Source: Researcher's work based on data from Table 1.

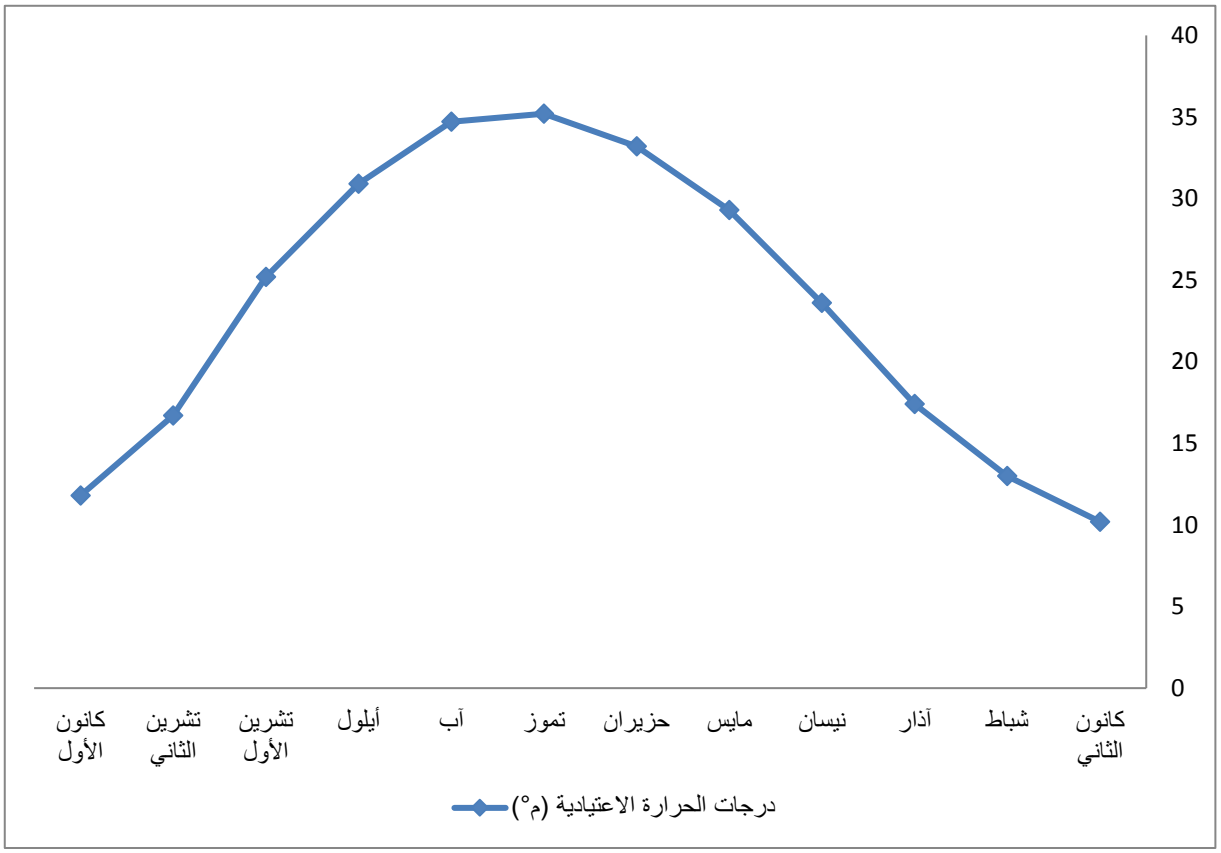
B. Temperature:

Table (1) and Figure (2) show that temperatures in the study area experience a clear contrast between summer and winter. Temperatures begin to rise gradually during the spring, beginning in April, when the average monthly temperature reaches approximately 23.6°C. This rise continues until it reaches its peak during June, July, and August, when the average monthly temperatures reach 33.2°C, 35.2°C, and 34.7°C, respectively, with the highest monthly average recorded in July (35.2°C). This rise leads to increased evaporation rates and, consequently, an increase in plants' need for water due to moisture loss through evaporation and transpiration. This rise in temperatures is attributed to the sun's rays being directly overhead, or near-directional, during the summer, the limited influence of low-pressure systems, and the region's distance from marine influences, which typically contribute to temperature regulation.

In contrast, temperatures begin to gradually decline in the fall, starting in September, with a monthly average of 33.7°C (93.7°F). They continue to decline until they reach their lowest levels in the winter months, particularly in January, February, and March. Monthly averages were recorded at 11.3°C (52.3°F) and 18.2°C (64.8°F), respectively, with the lowest temperature recorded in January at 11.3°C (52.3°F).

This decrease is attributed to the inclination of the sun's rays, the increased number of low-pressure systems, and the shorter daylight hours compared to nighttime. Since the study area is located within Babil Governorate, one of the governorates of the Middle Euphrates, it is far from marine influences. It lacks dense vegetation, which moderates temperatures in both summer and winter. From the above, it is clear that temperatures in the study area are suitable for the growth of many crops, including grains, vegetables, and fodder, each according to its agricultural season. This indicates the positive role of heat in the potential expansion of agricultural land use within the region. ( ).

Figure 2: Graphic representation of monthly average temperatures/°C /°C at the Hillah station



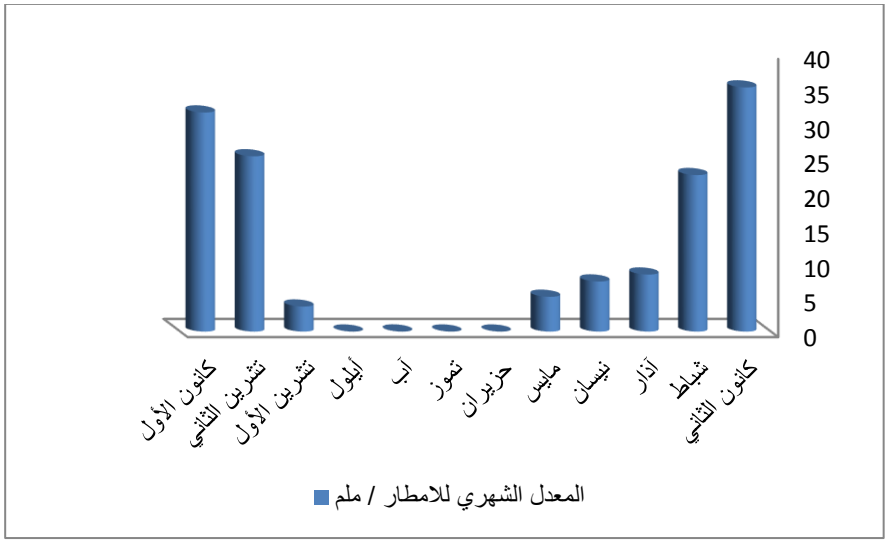
T - Rainfall:

It is clear from the analysis of Table 1 and Figure 3 that the rainfall in the study area is low and characterized by fluctuations from year to year, as the total annual rainfall in the study area for the year 2022 is 271.71 mm. It begins to fall in small quantities starting from November, recording (25.2) mm, then continues to rise in December, reaching (31.5) mm, and reaches its maximum rainfall in January, recording (35.1) mm, which is considered the rainiest month, and (22.5) mm were recorded in February. 4- Winds:

By analyzing the data in Table 1 and Figure 4, it is indicated that the monthly average wind speeds in the study area change between winter and summer due to the influence of other climatic elements. The increase in wind speed rates gradually began in the spring in March, April, and May, where each of them reached (2.1m/s), (2.4m/s), respectively, due to the gradual rise in temperatures. Then, it reached its highest average in the summer months of June and July. 5. Humidity:

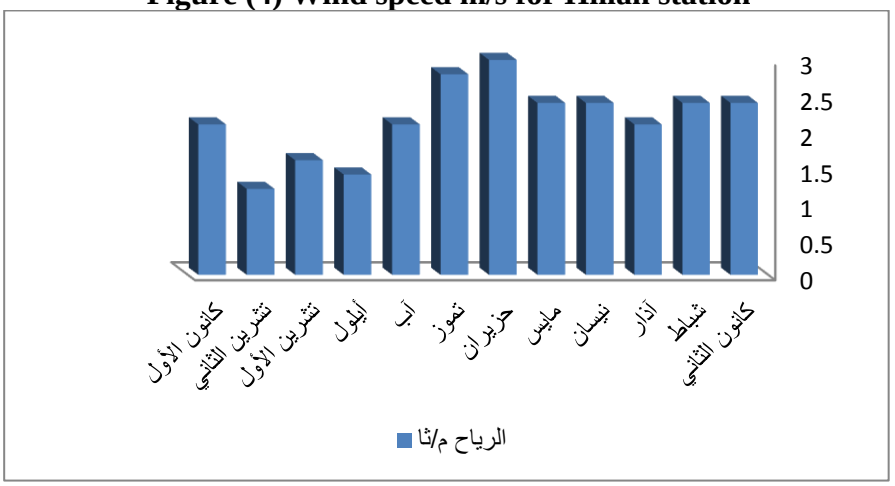
Relative humidity is defined as the percentage of water vapor actually present in the air at a given temperature and pressure, relative to the amount that the air can hold at the same temperature and pressure to make the air saturated. Relative humidity varies temporally and spatially, and this variation affects agricultural land use. Table (1) and Figure (5) show that the relative humidity in the study area is 41.5%, but the rate varies from season to season. Relative humidity also varies throughout the day due to the influence of temperature, wind, and vegetation in the region. A decrease in humidity is observed in the summer, followed by a gradual decline in the spring. Humidity rates were recorded in April and March at 35% and 28%, respectively, and then continued to decline with rising temperatures until reaching their maximum during the hot summer months of June, July, and August, when they all reached 25%, 22%, and 27%, respectively, due to the scarcity or absence of precipitation of all kinds, accompanied by high temperatures (1).

Figure (3) Monthly rainfall average (mm) for the Hillah station



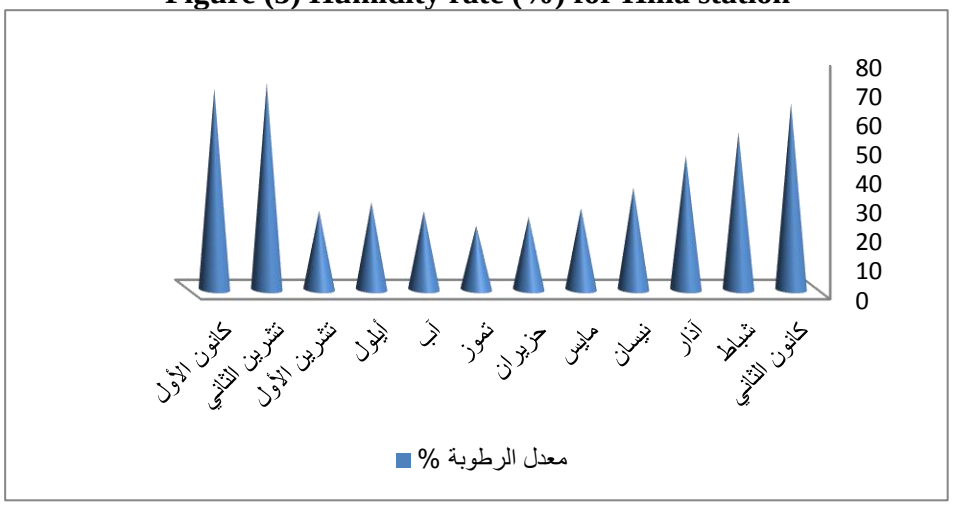
Source: Researcher's work based on data from Table 1.

Figure (4) Wind speed m/s for Hillah station



Source: Researcher's work based on data from Table (1).

Figure (5) Humidity rate (%) for Hilla station



Source: Researcher's work based on data from Table (1)

3. Soil:

The soils of river banks and valley bottoms located within the elevated areas along the banks of the Shatt al-Hillah River and its tributaries are among the most densely populated rural areas. This is due to the characteristics of these soils, which include good drainage and high organic matter content. This is closely linked to the intensity of agricultural activity, particularly palm cultivation, which is concentrated in

these areas.

The second type of soil is river basin soil, which researchers classify into three main types based on their elevation level relative to the riverbed: high-basin soil, lowland soil, and marsh soil. These types are suitable for growing field crops and vegetables and represent the most significant proportion of soils in the study area.

In addition, dune soil is widespread in the region, known for its low agricultural productivity due to the nature and density of the shifting sand, which limits its use in farming activity. There are also other types of soil characterized by high salinity and high groundwater levels, which negatively impact population density in these areas due to their limited suitability for agriculture and settlement.

4- Water Resources:

The water resources in the study area are surface water, represented by the Hilla River and its branching streams.

A. Surface Water:

The Hilla River is one of the Euphrates River streams, the leading water resource in the study area, drawing its water from the headwaters of the Hindiya Dam, which was built on the Euphrates River. Given the importance of the streams as the leading irrigation network for the Hashimiya District, they can be divided into the following:

The streams that branch off from the left bank of the Hilla River within the Hashimiya District. These streams flow from north to south, east to southeast. These streams include the Al-Bashiya Stream, the Al-Khamsimiyya Stream, the Mishmish Stream, the Al-Awadil Stream, and the Al-Kadas Stream.

The streams that branch off from the right bank of the Hilla River, which follow the slope of the surface of the study area, extending towards the west and southwest, are (Wasmi Stream, Alaj Stream, Amadiya Stream, Hashimiya Stream, Al-Jarbouiya Stream, Al-Bazel Stream, and Al-Abkhar Stream)

Second: Population Characteristics in Al-Hashimiya District:

Studying population characteristics is of paramount importance in this study, as they are a phenomenon related to the population, especially the economically active population. It explains the population's spread and distribution, the nature of their economic activities, and the problems they face. Humans are the builders of civilization, and their hands cultivate the land, establish factories, pave roads, and manufacture means of transportation, paving the way for a better life for themselves and for future generations. Geographers have focused their attention on them, as they inhabit the land and are concerned with its features, forms, and resources. Hence, there is an interest in studying human groups in their relationship to the geographical environment. Many studies devote significant attention to population characteristics, as these characteristics reflect, in part, the natural and spatial movement of the population and their impact on population size and growth. Naturally, areas of interest in this topic are concentrated within geographical studies, which play a significant role in highlighting regional variation in population growth. Among the demographic indicators of the population in Al-Hashimiyah District is its spatial distribution:

Population Distribution

Table (2) and Figure (6) show variations in the population distribution within administrative units, as follows:

The population numbers recorded that Al-Madhatiyah Subdistrict had the highest percentage in the 1997 population census, at 32.9%, while the center of Al-Hashimiyah District had the lowest rate, at 7.7%. Meanwhile, the 2018 estimates recorded that Al-Qasim Subdistrict had the highest percentage, at 32.4%, while Al-Tali'ah Subdistrict had the lowest rate, at 8.4%. This variation is attributed to the population movement in the study area moving westward toward the center of Al-Hillah District in search of work and various administrative services.

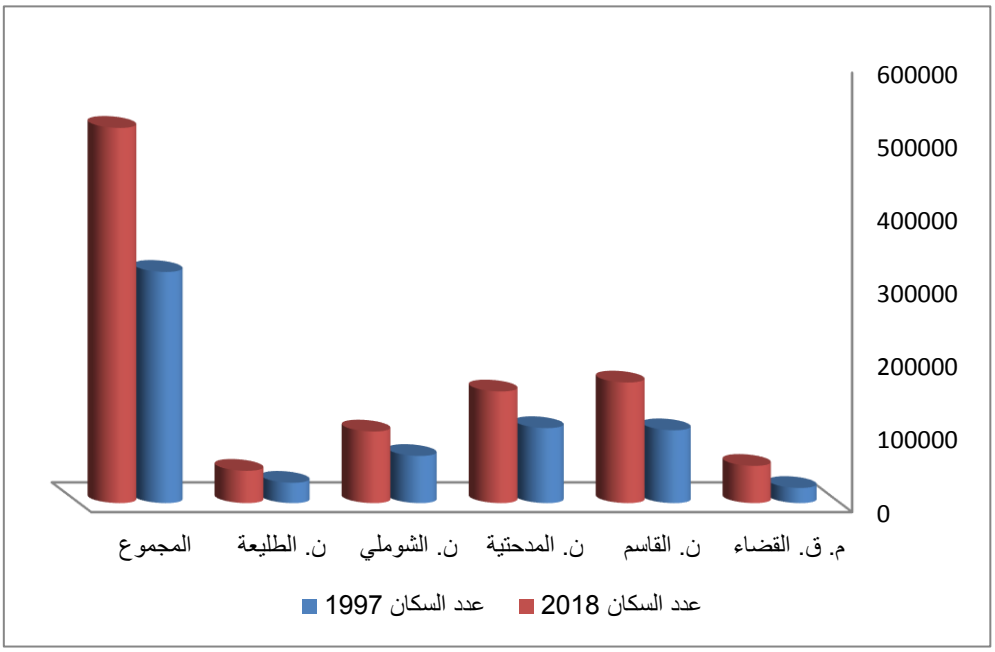
Table (2): Population distribution of the study area according to the 1997 census and 2018 estimates

Percentage 2018	Population 2018	Percentage 1997	Population 1997	Administrative Unit
9.972687	51118	6.6	20784	Judicial District
32.30403	165584	31.6	99994	Al-Qasim District
29.90089	153266	32.5	102966	Al-Madhatiyah

				District
19.17652	98295	20.5	64759	Al-Shomali District
8.64587	44317	8.8	27917	Al-Tali'ah District
100	512580	100	316420	Total

Source: Republic of Iraq, Ministry of Planning, Central Statistical Organization, Babil Statistics Directorate, 1997 Population Census Results and 2018 Estimates.

Figure (6): Graphic representation of the population distribution of the study area according to the 1997 census and 2018 estimates.



Source: Researcher's work based on data from Table (2)

Chapter Three

The Economic Structure of Al-Hashimiya District

Humans have engaged in economic activity since their first appearance on this earth, seeking sustenance and shelter to sustain life. Over the course of their long existence, their economic endeavors have evolved in a variety of ways. The economic professions they have practiced and continue to practice today represent a continuous and interconnected chain of occupations, beginning with gathering and hunting, alongside today's professions of herding, agriculture, industry, and trade. Humans remain in a constant struggle with the natural environment to harness and control it for their own benefit.

The economic activities in Al-Hashimiya District reflect both the natural environment's conditions and the long history of human settlement. Economic activities can be studied according to the following:

First: Agricultural Activity:

The study area is characterized by the availability of suitable natural resources, which have contributed to the success and continuity of agricultural activities. The most prominent of these resources is the presence of fertile soil ideal for agriculture, as well as suitable climatic characteristics such as temperatures, humidity levels, winds, and rainfall. In addition, water resources are available, resulting from an extensive network of rivers and streams, which provides a sustainable source of irrigation. In addition, the abundance of labor is a significant factor in promoting agricultural activity in the region. Farming activity is of great importance in providing food and clothing, and is also used as a raw material in industry. It is also essential for the strength of the state, as it constitutes a fundamental pillar in achieving economic development. The most important crops are wheat, barley, and rice, which vary in their natural and human growth requirements. They are a primary food source, containing half of the calories available for an individual's diet.

1 - Wheat and Barley

These two crops are among the most critical food crops,

and most agricultural researchers study them together because they belong to the same family, the Poaceae family. Their roots, stems, branches, and flowers are similar. Wheat thrives on mixed, clayey, or silty soils rich in lime and organic matter, characterized by good drainage and a lack of salt. Barley thrives under adverse environmental conditions, such as salinity, weather fluctuations, and resistance to agricultural pests and drought, as it can withstand these conditions more than wheat and other grain crops. The ideal temperature for wheat is estimated to be 25°C, while for barley, the perfect temperature is 20°C. Wheat and barley are cultivated well in the study area to meet the requirements of these two crops in terms of fertile soil, as grain is grown in the soil of river banks, streams and irrigation canals, and is cultivated in smaller quantities in the soil of river basins that are good for barley cultivation, in addition to the abundance of water and the suitability of the climate for the growth of these two crops.

Barley production rate %	Barley production (tons)	Barley percentage %	Area planted with barley (dunums)	Wheat production rate %	Wheat production (tons)	Wheat percentage %	Wheat cultivated area (dunums)	Administrative Units
18	3692	17	8833	26	13614	22	20566	Al-Qasim District
32	6830	31	16460	40	20764	40	28840	Al-Madhatiyah District
39	8098	39	20712	19	9775	31	28667	Al-Shomali District
11	2389	12	6476	15	7978	15	13876	Al-Tali'ah District
100	21009	100	52481	100	52131	100	91949	Total District

Table (4) Total fruit production in Hillah Governorate for the year 2022

Total Production (Tons)	Palm Trees	Grapes	Apricot	Pomegranate	Pear	Fig	T.	Sour	An Orange	Administrative Units
0	0	0	0	0	0	0	0	0	0	Al-Hashimiyah Center
17760	17525	187	13	3	11	4	2	1	3	Al-Qasim District
30772	17365	12536	60	260	232	260	260	10	3	Al-Madhatiyah District
17262	17232	7	2	4	7	2	2	7	2	Al-Shomali District
6253	6226	8	0	0	0	1	15	1	3	Al-Tali'ah District
72047	58348	12738	75	267	250	267	281	19	11	District Total

Source: Republic of Iraq, Ministry of Agriculture, Babil Governorate Directorate, Plant Production Division, unpublished data for 2023.

While Al-Tali'a district came in last place with a percentage of (12%) of the total area planted with barley in all administrative units, we note the record low production of wheat, due to its consumption as green and dry fodder by farmers, and its lack of marketing to marketing centers in Hashimiyah due to its low prices. The price of one ton of wheat reached 800,000 dinars per ton, compared to 400,000 dinars per ton of barley. Al-Shomali district came in first place in barley production with a percentage of 39% due to the large area planted and to compensate for the low production of wheat. Al-Madhatiyah district came in

second place in terms of production with a percentage of (32%), Al-Qasim district came in third place with a rate of (18%), and finally Al-Tali'a district with a rate of (11%) of the total production in the study area. 2 - Fruit Orchards:

Fruit trees are characterized by their diverse and numerous species. There are several classifications of fruit trees, some based on botanical classification, while others emphasize the nature of the fruit produced. When classifying fruit trees, some emphasize the nature of their growth. Accordingly, fruit trees are classified into two main types: evergreen and deciduous trees. Fruit orchard cultivation thrives in well-drained, alluvial, mixed soils, such as riverbed soils, and is less common in poorly drained, clayey soils.

The prevailing climatic conditions are suitable for their cultivation, in terms of high temperatures and the continuous availability of water via the Hillah River and its branching irrigation canals. There is a clear connection between fruit cultivation and water sources, as it occupies a longitudinal range along the main irrigation canals and the Hillah River, starting from its entrance to the study area and extending to the city of Hashimiyah, which is famous for its palm tree cultivation. Palm trees are among the most abundant fruit trees, leading other fruit trees in area and production (Table 4). The total area planted with palm trees amounted to (43,635) dunums out of the total area planted with fruit trees, amounting to (47,532) dunums. The number of palm trees in the study area amounted to about 1,268,218 palm trees out of the total number of fruit trees, which amounted to 2,149,750 trees. The quantity of date production amounted to (58,348) tons out of the total production of fruit trees amounting to (72,047) tons. Al-Qasim district came in first place with dates (17,525) tons, followed by Al-Madhatiyah district in second place (17,365) tons, while Al-Shomali district came in third place with a production of (17,232) tons, and finally Al-Tali'ah district (6,226) tons. As for the rest of the fruit trees, Al-Madhatiyah district came in first place in the cultivation and production of citrus fruits, grapes, pears, pomegranates, and others. This is due to the fertility of its soil, the abundance of water, and the agricultural expertise inherited by farmers, as these trees are spread along the Hillah River and its branching streams. Al-Qasim district came in second place in fruit tree production, while limited and small quantities of fruit are grown in the Al-Shomli and Al-Tali'ah districts. This is due to the lack of care and experience in planting these trees and the fact that the soil is less fertile and contains sandy and saline lands, most of which are unsuitable for agriculture. Fruit trees are exposed to the spread of diseases and insect infestations, which has led to a decrease in their production. Large areas of fruit trees were exposed to drought in 2000 when the defunct regime drained the marshes, which negatively affected the water level in the study area

3 - Vegetables

Vegetables are a staple food for the population, and demand for them is increasing due to the rising standard of living and their close connection to health. This is due to the suitability of natural resources, which play a significant role in concentrating vegetable cultivation in the study area, represented by the variability of climate elements and the diversity of soil. This is in addition to the availability of irrigation water from the river and stream network, which meets the water needs of vegetables, and the availability of skilled labor. This has helped the population turn to vegetable cultivation and care. Vegetables can be classified according to their thermal requirements and the growing and ripening season, as follows:

A - Winter Vegetable Crops

Winter vegetable crops include broad beans, green onions, lettuce, chard, scallions, spinach, turnips, radishes, carrots, fennel, cauliflower, and others. They are planted in the fall and early winter, and some varieties, such as chard and green onions, ripen in the winter. However, most ripen in the spring, such as broad beans, radishes, and lettuce. The area planted with these crops amounted to approximately 11,086 dunums, with a production of 4,046 tons. The Madhatiya area shows it occupies first place in terms of area and production (3,900) dunums (1,423) tons. This is due to the fertility of the well-drained soil, represented by the soil of rivers and streams, and the abundance of labor, as vegetable cultivation requires a large workforce, and the proximity to city centers, where demand for it increases. Al-Qasim district ranked second in terms of cultivated area and production, reaching 3,318 dunums and 1,211 tons each, respectively. Al-Tali'ah district came in third place in terms of cultivated area and output, (2,862) dunums and (1,045) tons. Al-Shomali district came in last place in terms of area and production, (1,006) dunums and (367) tons. This is due to the low fertility of the soil and the prevailing agricultural pattern in the district, which is limited to the cultivation of grains primarily. Table (5). Natural factors play a significant role in vegetable production. Seasonal temperature variations have facilitated the diversification of vegetable cultivation. This is in addition to the quality of the soil, especially riverbed soil, and the abundance of water resources. Furthermore, human factors, such as the availability of

labor and the proximity of these farms to city centers, have facilitated the transport of these crops to markets and their consumption fresh or cooked.

Table (5) Winter Vegetable Crop Production in the Study Area 2022

Administrative Units: Cultivated Area/Dunum, Production/Tons of Yield Area..

2613	5226	Al-Qasim District
5363	10726	Al-Madhatiyah District
1895	3790	Al-Shomli District
1513	3026	Al-Tali'ah District

Table (6) Cultivated area and production of yellow corn for the years 2005 and 2023 Source: Republic of Iraq, Ministry of Agriculture, Babil Governorate Directorate, Plant Production Division, unpublished data for the year 2023. B-Summer Vegetable Crops

Summer vegetable crops include spring potatoes, okra, eggplant, tomatoes, cucumbers, beans, peppers, watermelons, melons, and others. They are grown in the spring and early summer. The area planted with these crops amounted to approximately 22,768 dunums, and the production amounted to 11,384 tons. According to the data, Al-Madhatiyah district ranked first, with the area planted with various summer vegetables amounting to approximately 10,726 dunums. Al-Qasim district came in second place with 5,226 dunums, Al-Shomali district ranked third with 3,790 dunums, and finally Al-Tali'ah district with 3,026 dunums. As for the production amount, Al-Madhatiyah district maintained its lead with 5,363 tons, followed by Al-Qasim district with 2,613 tons, Al-Shomali district ranked third with 1,895 tons, and Al-Tali'ah district ranked last with 1,513 tons.

Second: Industrial Crops

Industrial crops are among the most essential pillars upon which the economies of many countries around the world are based, as they are directly or indirectly involved in numerous industries that meet human needs for food, clothing, and many other urgent daily uses and requirements. The most important of these crops in the study area is yellow corn:

Yellow corn is a vital summer grain crop due to its value and multiple uses for both humans and animals. It ranks second in importance after wheat and barley. It belongs to the Poaceae family, and its significance lies in its numerous nutritional and industrial uses, including the use of its grains to extract starch, which constitutes 60% of the grain's components. It thrives in fertile clayey and alluvial soils and is affected by salinity. Therefore, the corn crop is considered a measure of soil fertility. This crop does not thrive in light or heavy sandy soils with poor drainage. The optimum temperature for germination and flowering is (32-35°C). High winds negatively affect it during the flowering stage, as strong, dry winds cause pollen grains and stigmas to dry out. Increased wind speeds cause the plant to lie dormant, especially after irrigation, thus reducing production. The study area is famous for the cultivation and production of yellow corn. As shown in Table 6, there is a variation in the cultivated area and output between 2005 and 2023. The total cultivated area in the study area was 74,633 dunums in 2005, and this area decreased to 46,551 dunums in 2023, which led to a decrease in the production quantity from 70,360 tons to 38,600 tons. The reason for this is the lack of government support for farmers and the reduction in the amount of fertilizers allocated per dunum by the responsible authorities, which led to an increase in the price of one ton of chemical fertilizers (urea) to (850,000) dinars in 2023, in addition to a decrease in the cost of yellow corn to less than (400,000) dinars, with a high discount rate from the Hashemite Grain Silo Company, which receives the crop from the farmers. The discount rate may sometimes reach 20% of the total price. All of this prompted farmers to refrain from planting this crop, which negatively affected the amount of area and production. At the administrative unit level, the cultivated area and output decreased between 2005 and 2023. Al-Shomali district came in first place in terms of cultivated area and production in 2005, but its quantity decreased in 2023, ranking second in production with 13,795 tons.

2023		2005		Administrative Units
Production/ton	Cultivated area / dunum	Production/ton	Cultivated area / dunum	
5145	7186	18180	17587	Al-Qasim District
17325	17500	21284	21281	Al-Madhatiyah District
13795	18500	21626	24858	Al-Shomali District

2335	3365	9270	10907	Al-Tali'ah District
38600	46551	70360		Total

Source: Republic of Iraq, Ministry of Agriculture, Babil Governorate Directorate, Plant Production Division, unpublished data for 2023.

Al-Madhatiyah District ranked second in terms of cultivated area and production in 2005, but ranked first in production in 2023. This is due to the fertile soil, represented by the soil along rivers and streams, and the abundance of water in the district, which led to an increase in the average yield per dunum. The district's total production amounted to approximately 17,325 tons, while Al-Qasim District ranked third in terms of cultivated area and total production. Al-Tali'ah District ranked last in terms of cultivated area and production. This is due to the small area suitable for agriculture and the fact that most of it is poorly drained, where the groundwater level sometimes rises above the soil surface, as is the case in the southern and southwestern parts of the district. Third: Livestock:

Livestock is of great importance due to its contribution to agricultural production. It also represents the primary food component, providing protein and serving as an essential source of protein. It also serves the needs of many industries, particularly food industries, in addition to its usefulness in agricultural production processes. The study area is famous for raising sheep, cows, goats, buffalo, poultry, camels, beehives, and fish, as follows:

1 - Sheep

Raising sheep is of great economic importance to the lives of rural residents, as it provides meat, wool, and hides, which are an essential food source for the region's residents and other areas, and a raw material for industry. Sheep are sold in the livestock market to retail and wholesale traders from the nearby governorates of Baghdad, Najaf, and Karbala, generating significant profits for farmers living in villages and rural areas. Furthermore, the waste from these animals is used as an organic fertilizer added to the soil. Sheep are among the most numerous animals in the study area, numbering 57,029 heads. Their numbers vary from one district to another. Notably, the Shomali district leads in sheep numbers, with approximately 25,000 heads. This is due to the vast amount of fallow and abandoned lands where jungles grow in the district, as well as the fact that farmers graze these animals at the expense of agricultural land. This has hurt agricultural production, as previously mentioned, in the production of wheat, barley, and vegetables, as the district ranks last in the production of these crops. Al-Madhatiyah district came in second place with several sheep reaching (12,400 heads) due to the large area of the district and the presence of vast pastures, especially after the wheat and barley harvest season, where sheep are grazed until the next planting season. Al-Qasim district came in third place with (11,500) heads, and finally Al-Tali'ah district came in last place with (8,129) heads. This is due to the small size of the district and the small number of its population, which affected the average share of sheep per person, in addition to the scarcity of pastures due to the poor soil in most parts of the district (Table

2 - Cows:

Despite their small number compared to sheep, they are rarely absent from rural homes. They are sometimes raised in cities because they rely on soft fodder, such as hay, or dry fodder, such as barley, and do not require large pastures. Natural conditions are also suitable for these animals, as they are raised in the shade of trees and palm trees, which are widely distributed, reducing the intensity of the sun's heat in the summer. In the winter, they are raised in special pens or, sometimes, in fields prepared for this purpose. They are a significant economic resource for the population, providing a source of additional income through milk and dairy products, as well as meat, which is the primary food source for the population and is utilized in the food industry.

Meanwhile, the waste of these animals is used in the form of animal fertilizers, which increases the amount of crucial organic matter in the soil. Cows come in second place in the number of livestock, with a total of 48,786 heads. Al-Madhatiyah district came in first place in the number of cows, with their number reaching about 15,786 heads, followed by Al-Shomali district in second place, with 15,000 heads. In comparison, Al-Qasim district came in third place with 13,000 heads, and Al-Tali'ah district came in last place with 5,000 heads table (7).

Table (7) Number of livestock in the study area

Camel (Head)	Buffalo (Head)	Goat (Head)	Cows (Head)	Sheep (Head)	Administrative Unit
0	0	0	0	0	Judicial Center
150	5000	2000	13000	11500	Al-Qasim District

15	2400	1659	15786	12400	Al-Madhatiyah District
485	4000	2000	15000	25000	Al-Shomali District
115	381	1500	5000	8129	Al-Tali'ah District
765	11781	7159	48786	57029	Judicial Total

Republic of Iraq, Ministry of Agriculture, Babil Agriculture Directorate, Agricultural Divisions in the Sub-Districts, Animal Production Department, Unpublished Data, 2022.

3. Poultry

Poultry is both a source of income and a source of food. Poultry farming in the study area suffers from a lack of government support and competition from imported products, which enter the country at low prices, coupled with increased production costs, which burden breeders. Furthermore, a high mortality rate is attributed to a lack of veterinary care, resulting in the neglect and closure of numerous poultry farms. As for the study area, there are (255) fields, the number of working fields of which is (128) fields with a production capacity of (1877) tons of meat. Al-Shomali district came in first place with (43) fields. A production capacity of (630) tons, and the Al-Qasim district came in second place in terms of the number of fields, amounting to (40) fields, and a production capacity of (586) tons.

In comparison, Al-Madhatiyah district came in third place with (30) fields and a production capacity of (440) tons. Finally, Al-Tali'ah district (15) fields and a production capacity of (221) tons, and poultry are raised in rural areas. Table (8).

Table (8) Number of poultry production fields and their production capacity for the year 2022

Production Capacity/Ton	Number of Working Fields	Administrative Units
586	40	Al-Qasim District
440	30	Al-Madhatiyah District
630	43	Al-Shomali District
221	15	Al-Tali'ah District
1877	128	Total

Source: Republic of Iraq, Ministry of Agriculture, Babil Agriculture Directorate, Agricultural Division in Al-Shamiya District, Animal Resources Department, unpublished data, 2023.

4 - Fish

The study area includes only four lakes, two of which are in Al-Qasim District, one in Al-Shomali District, and another in Al-Tali'a District. The average design capacity of these lakes was 41 tons per lake. Other lakes are inactive due to the lack of government support for this vital resource and its consequent neglect by breeders. Livestock in the study area generally suffers from several factors, despite the progress made in their numbers and the healthcare provided by veterinary clinics. Among the most critical problems are ( ):

1. Low production compared to the total livestock population.

2. Lack of modern methods and techniques for raising animals and improving their production.

3- Malnutrition and the lack of high nutritional value animal feed and the scarcity of pastures for them, in addition to the scarcity of fodder crops planted, such as alfalfa and clover, as the area planted with alfalfa has reached about 5304 dunums, and this area is limited compared to the large numbers of livestock. The responsible agricultural authorities distribute limited quantities of fodder to animal breeders, forcing them to purchase fodder from local commercial markets. Fourth: Industrial Activity:

Service industries occupy the first place in terms of the number of industrial establishments, amounting to 406 establishments, representing 38.5% of the total number of industrial establishments. They also ranked first in terms of the number of workers in the industry, amounting to 1014 workers, representing 33.1%. These service industries include the car repair industry, machinery, generators, and amplifiers of both diesel and electric types, and all of these food industries

ranked second in terms of the number of establishments and number of workers, representing 15.2, 18.1%) for. The engineering industry ranked third in terms of the number of industrial establishments and workers, representing 13.8% and 14.6%, respectively. Wood industries ranked fourth in terms of the number of establishments and number of workers, representing 8.9%, 9.9%, and so on for the rest of the industries. At the level of administrative units in the study area, it is noted that Al-Madhatiyah District ranked first in terms of the number of industrial establishments and the number of workers, representing (453, 1647) for each. (9).

Table (9) Number of industrial establishments and workers in the study area

Ration %	Total number of employees	Type of Industry
18.1	554	Food
11.3	345	Textiles
9.9	303	Wood and Furniture
0.0	0	Electrical
5.3	161	Construction
14.6	447	Engineering
33.2	1014	Chemical Industries
3.9	120	Other Industries
3.7	112	Handicrafts
100	3056	Total

Source: Republic of Iraq, Ministry of Municipalities and Public Works, Babil Governorate Municipality Directorate, unpublished data, 2022.

CONCLUSIONS AND RECOMMENDATIONS

First: Conclusions

1. Al-Madhatiyah District ranked first in cultivated area, with a percentage of 40%, while Al-Shomali District ranked first in barley production, with a rate of 39%.
2. Al-Madhatiyah District ranked first in the cultivation and production of citrus fruits, grapes, pears, and pomegranates, with a total of 30,772 tons.
3. Al-Madhatiyah District appears to rank first in terms of area and production of winter and summer vegetable crops, with 3,900 dunums (1,423) tons of winter crops, and 10,726 dunums of summer crops.
4. Al-Shomali District ranked first in terms of cultivated area and production of yellow corn in 2005, while Al-Madhatiyah District ranked first in production in 2023.
5. Al-Shomali District ranked first in the number of sheep, amounting to approximately 25,000 heads, while
6. Al-Madhatiyah District ranked first in the number of cattle, amounting to approximately 15,786 heads. Al-Shomali District ranked first in poultry farms, with 43 farms and a production capacity of 630 tons.
7. Service industries rank first in the number of industrial establishments, reaching 406 establishments, representing 38.5% of the total number of industrial establishments.

Second: Recommendations

1. Prepare a spatial development plan that takes into account the geographical distribution of natural resources and directs investments according to the environmental potential of each region.
2. Improve infrastructure by developing and modernizing agricultural and industrial infrastructure, particularly in marginalized rural areas, to stimulate and diversify economic activity.
3. Support sustainable agriculture, promote the use of modern agricultural technologies, and provide technical and financial support to farmers to increase productivity and reduce dependence on traditional resources.
4. Stimulate local industries: Encourage the establishment of small and medium-sized industrial complexes that rely on local resources, and provide investment incentives to attract capital.
5. Build spatial databases, such as an updated and integrated spatial database (GIS), to monitor the actual distribution of economic activities and

support development decision-making.

6. Develop educational and vocational programs that are compatible with the nature of economic activities in the district, whether agricultural or industrial, to bridge the gap between supply and demand in the markets.

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