American Journal of Social and Humanitarian Research

Vol. 6 Issue 8 **| pp.** 1993-2007 **| ISSN:** 2690-9626
Available online @ https://globalresearchnetwork.us/index.php/ajshr

Article

Volumetric Composition of Food Industries in Babil Governorate

Suha Muharraf Muhammad[1]

1. Babil Education Derectorate, Al-Madinah Al-Munawwarah Mixed Elementary School
* Correspondence: suha.muharaf4025@bab.epedu.gov.iq

Abstract: Food industries are among the important transformation industries spread in Babil Governorate ،which depend on the agricultural raw materials available in the governorate itself ،in addition to some other auxiliary materials. These industries vary between food and non-food. The problem is represented by a main question that can be summarized as follows: What is the nature of the current and expected future relationship between agricultural production and food industries in the governorate? The study hypothesis is determined by the existence of available and diverse potentials (natural ،population and economic) in the governorate to invest in the establishment of food industries. One of the objectives on which the study was based is to analyze the study of the reality of agricultural production ،both plant and animal ،and the extent of its contribution to the development of food industries in the governorate. One of the justifications for the study is the neglect of the concerned authorities of the nature of the relationship between the agricultural and industrial sectors and the necessity of working diligently to activate interaction between the two sectors to ensure the success of both. The study adopted the systematic approach ،as the subject of the study was chosen ،which is food industries. The number of factories in Babil Governorate amounted to about 2540 food industries factories ،representing 23.2 ٪of the total food industries in Iraq

Keywords: Size distribution, Coefficient of settlement, Index of diffusion, Coefficient of variation.

Citation: Muhammad, S. M. Volumetric Composition of Food Industries in Babil Governorate. American Journal of Social and Humanitarian Research 2025, 6(8), 1993-2007

Received: 10th May 2025
Revised: 16th Jun 2025
Accepted: 24th Jul 2025
Published: 12th Aug 2025

1. Introduction

Industry is one of the essential activities that humans rely on to meet their needs for food, housing, clothing, tools, and luxuries, whether in a developed or developing country and in various environments [1]. Through it, humans seek to optimize the use of available resources to achieve the highest level of benefit or provide comfort. Industry is also a key tool for transforming agricultural raw materials into products with added economic value, generating additional income, creating new job opportunities, and contributing to the acceleration of economic development [2], [3]. The success of agricultural manufacturing depends on the availability of adequate quantities of high-quality agricultural materials.

In Babil Governorate, food industries constitute one of the most prominent areas of manufacturing, utilizing local agricultural raw materials and other supporting materials [4], [5]. These industries vary between food and non-food. Agricultural industries play a pivotal role in securing food for the population, increasing farmers' income, and creating job opportunities that contribute to improving the standard of living.

1. Study Problem:

The problem is represented by a primary question, which can be summarized as follows: What is the nature of the current and expected future relationship between

agricultural production and the existing food industries in the governorate? A set of secondary questions can be derived from this, such as: Does Babil Governorate have sufficient capabilities to develop food industries? Is local agricultural production efficiently invested in existing food industries, and what are the future prospects for this investment? To what extent is agriculture capable of serving industrial production, both currently and in the future?

2. Study Hypotheses:

The study hypothesis is based on the premise that Babil Governorate possesses diverse natural, demographic, and economic resources that provide opportunities for developing food industries, relying on local plant and animal agricultural production [6], [7]. However, these resources, especially agricultural production, have not been sufficiently invested in establishing food industries that use it as a primary input in their production processes.

3. Study Objectives:

The study's objectives focus on analyzing the reality of agricultural plant and animal production and assessing its contribution to supporting food industries in Babil Governorate [8], [9]. It also seeks to evaluate agricultural production directed at industrial activity and study the relationship between agricultural production and food industries, while developing future visions to address existing problems and support the development of industries that rely on agricultural inputs.

4. Study Justifications:

The study was justified by the lack of interest from relevant authorities in the nature of the relationship between the agricultural and industrial sectors, and the need to enhance interaction between them to ensure the success of each sector. It also aims to highlight the importance of food industries in achieving social efficiency by reducing unemployment, providing job opportunities, raising the standard of living, and increasing the well-being of the population. In addition, the study seeks to support local agricultural production and highlight the key factors for developing agricultural industries based on plant and animal raw materials [10]. It also aims to create a database and a detailed study to be presented to decision-makers to support industrial development in the governorate.

2. Materials and Methods

The study followed a systematic approach, selecting food industries as the research topic and identifying Babil Governorate as the study area. The study relied on descriptive and analytical geographical approaches. Based on the available digital information and data collected during the research phases.

Boundaries of the Study Area:

The study defined the spatial scope of Babylon Governorate, located in central Iraq, within the astronomical coordinates between latitudes (32° 6 - 33° 8) north and longitudes (44° 5 - 45° 12) east. The governorate is bordered to the north by Baghdad, to the south by Qadisiyah and Najaf, to the east by Wasit, and to the west by Anbar and Karbala. The governorate's area is 5,119 km², constituting approximately 1.2% of Iraq's area, see Figure 1.

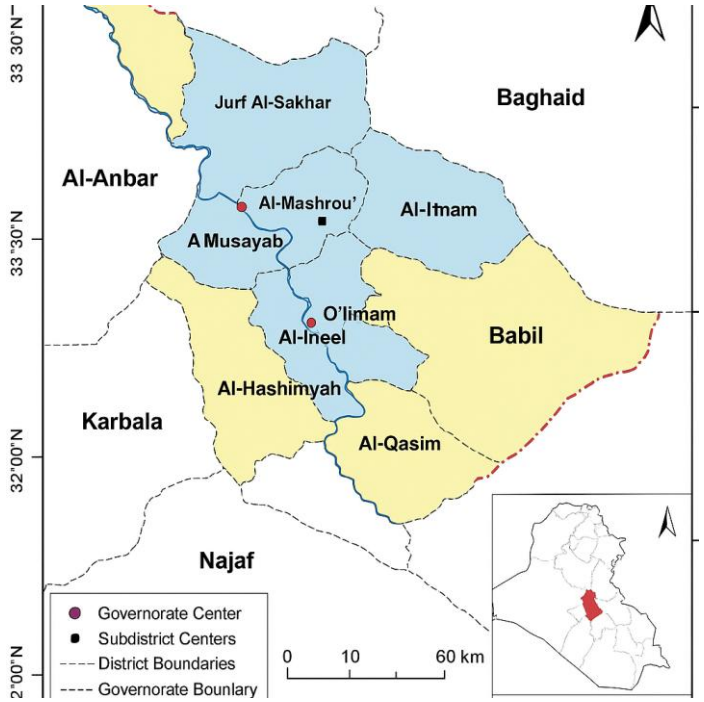
Babylon is located within the alluvial plain region and constitutes the northern part of the Middle Euphrates region. Its geographical location makes it a connecting point between the central and southern governorates. It is approximately 100 km from Baghdad, 45 km from Karbala, 65 km from Najaf, and 85 km from Diwaniyah. The Euphrates River runs through its northern part and continues its flow along its borders with Najaf and Qadisiyah.

3. Results

The presence of the river has facilitated transportation and communication with neighboring provinces since ancient times [11]. It has also contributed to supporting

economic activities in its vicinity, providing the province with an economic base that helps support its population and attract migration from nearby areas .

Figure 1. Map of the location of Babil Governorate in Iraq.



Source: Republic of Iraq, Ministry of Water Resources, General Directorate of Survey, Map Production Department, 2024.

Section One - Factors Influencing the Food Industries in Babil Governorate:

Economic factors constitute a part of the geographical factors that directly or indirectly influence the food industries in the governorate, whether in their origin, development, or stability. These factors include a diverse group that sometimes operate independently and sometimes in an integrated manner. The following is a presentation of these factors, along with an explanation of the extent of their impact on the food industry.

1. Raw Materials:

Raw materials are the foundation from which everyday goods are manufactured. They include mineral raw materials, both metallic and non-metallic, such as sand, gravel, sulfur, and petroleum, in addition to agricultural materials such as grains, vegetables, fruits, sugarcane, and cotton, and animal products such as milk, wool, and leather, which are used in the food and textile industries.

Industry carries out its economic activity by transforming the form or state of raw materials to increase their usefulness to humans through various production processes. This requires companies to focus on the proportions of raw materials used in production as essential inputs, while studying their impact on the final product with the aim of selecting suitable locations for industry that benefit from lower transportation costs [12].

Despite the importance of raw materials, their impact on industrial localization has declined with technological progress and the development of transportation networks. It is no longer necessary to establish factories near sources of raw materials, as was the case. Previously

Agricultural crops play a pivotal role in agricultural industries, as industries linked to economic development depend on the abundance of these products. The availability of large quantities of crops allows for the emergence of multiple food industries. Furthermore, some agricultural products, such as fruits, vegetables, and fish, due to their perishability, require industrial processing for canning and reducing their exposure to spoilage during transportation or storage. Therefore, canning industries are often located in areas of production or consumption [13].

2. Market:

The size of the market directly affects the localization and concentration of the industry. The local market is often limited compared to regional or national markets, which reduces its relative importance. Meanwhile, larger markets offer broader opportunities for industry. However, the local market remains the launch pad for larger markets and a safeguard against significant fluctuations in demand. Not all industries can easily access foreign markets for various reasons.

Many industries prefer to locate within or near markets to avoid high transportation costs and protect products from spoilage, such as food, dairy, bakery, and ice cream industries. Some industries, such as clothing and toy manufacturing, require proximity to consumers to understand their tastes, in addition to their need for local labor. Also, some industries are clustered near specialized markets, such as the spinning and weaving industry in textile markets [14], [15].

Babil Governorate is distinguished by the size of its local market compared to neighboring governorates, due to its high population relative to its area. Several other factors have contributed to the expansion of the local market, most notably the improvement in purchasing power after 2020, especially after the lifting of economic sanctions on Iraq by UN Security Council Resolution No. 1483. This led to an increase in the salaries of government employees and the wages of private sector workers due to increased oil exports and rising global oil prices, which was reflected in a significant increase in financial revenues.

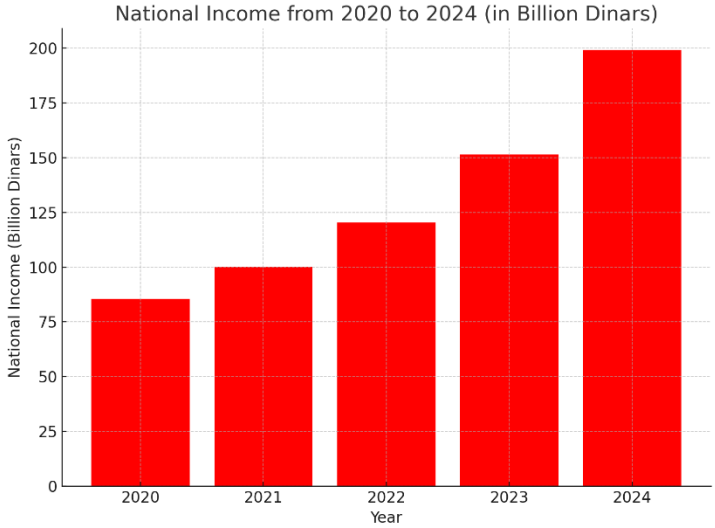
The average annual per capita income in Iraq increased from 2,926,339 dinars in 2020 to 3,372,433 dinars in 2021, and then to 5,970,822.3 dinars in 2024, as shown in Table 1.

Table 1. National income and the average per capita share of Iraqis for the period (2020-2024).

Year	National Income (Million Dinars)	Average Individual Income
2020	85,431,538.8	292,633
2021	100,100,816.6	337,243
2022	120,428,410.7	380,326
2023	151,416,101.4	466,039
2024	199,060,339.6	597,082

Source: Ministry of Planning, Central Statistical Organization, Annual Statistical Abstract (2020-2024).

Figure 2. National income and average per capita share of Iraqis for the period (2020-2024).



Source: Prepared by the researcher based on data in Table 1.

The increasing population in Babil Governorate and the improvement in income levels after 2020 have contributed to providing a favorable environment for the success of many

industries, due to the presence of large markets capable of absorbing a variety of quantities and types of industrial products. The governorate's location in central Iraq, within the Middle Euphrates region, and its proximity to Baghdad, along with the availability of a large local market, constitute an additional factor supporting the growth of industries, especially with the presence of a developed transportation network linking it to neighboring governorates, see Figure 2.

This geographical location provides local industries with good opportunities to market their products in various directions: south, north, east, and west, while bearing reasonable transportation costs. It also contributes to the ease of transporting raw materials and industrial products between Babil and the rest of the governorates, enhancing opportunities for expansion and continuity of local industrial activity.

3. Transportation:

The choice of an appropriate means of transportation is determined based on the type of industry, the nature of industrial facilities, the sources of plant and animal raw materials, in addition to the type and quantity of industrial products and their relationship to the main marketing centers. With the development of industries and the increase in production volume, transportation networks became essential for marketing products to regional and sometimes international markets.

Improved transportation methods led to higher land prices, shorter distances, and lower costs. The lower the transportation cost and the smaller it represents as a percentage of the total production cost, the greater the industry's chances of success. This helped in providing production inputs from multiple sources at reasonable prices.

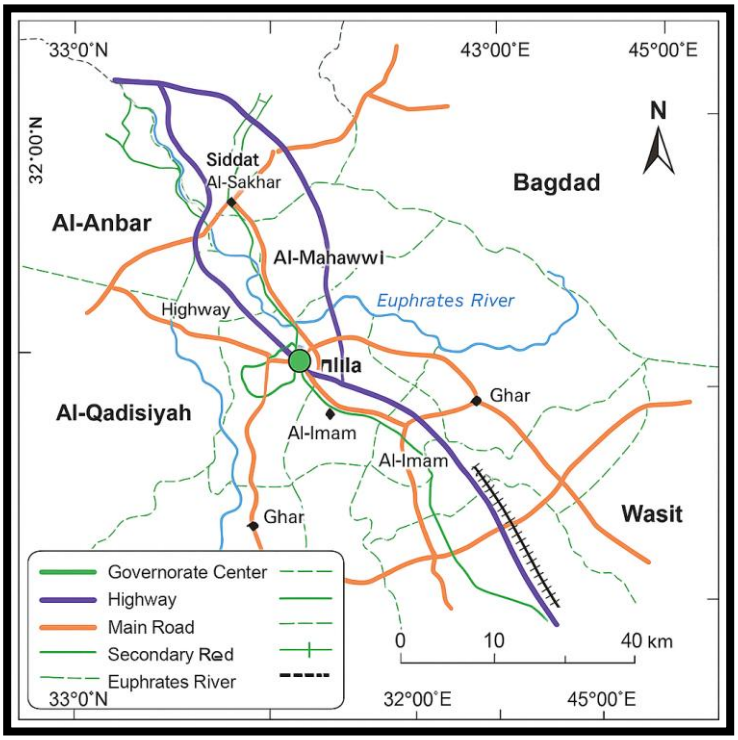
Data in Table 2. indicates that the total length of transportation roads in Babil Governorate reached 202 km. The Hillah-Baghdad Road is the longest within the governorate, at 50 km of its total length of 100 km, followed by the Hillah-Diwaniyah Road, which is 50 km within the governorate, out of a total length of 80 km.

Table 2. Transportation Roads in Babil Governorate in 2024 AD.

Road Name	Length (km) Within the Province	Total Length (km)
Hilla – Baghdad	50	100
Hilla – Diwaniyah	50	80
Hilla – Najaf	35	65
Hilla – Karbala	22	45
Haswa – Musayyib – Karbala	15	50
Hussein – Hilla – Karbala	15	-
Hussein – Musayyib – Karbala	15	-
Total	202	340

Source: Ministry of Housing and Construction, General Authority for Roads and Bridges, Babil Roads and Bridges Directorate, Technical Division, unpublished data, 2024.

Figure 3. Map of the transportation routes in Babil Governorate.



Source: Republic of Iraq, Directorate of Roads and Bridges in Babil Governorate, Technical Division, Map of the Governorate's Road Network 2024.

Table 3 shows that the total length of roads in Babil Governorate reached 355.8 km, while the governorate's area was 5,315 km². Accordingly, the average road density in the governorate was 0.32 km per square kilometer. Hillah District ranked first with a road density of 0.13 km², followed by Al-Musayyib District with a density of 0.11 km², then Al-Hashimiyah District with a density of 0.06 km², and Al-Mahawil District ranked last with a road density of 0.02 km².

Table 3. Road Density in Babil Governorate

District	Road Length (km)	Area (km²)	Road Density (km/km²)
Hilla	118	908	0.13
Al-Mahawil	35	1716	0.02
Al-Hashimiyah	93	1683	0.06
Al-Musayyib	109.8	1008	0.11
Total	355.8	5315	0.32

Source: Ministry of Housing and Construction, General Authority for Roads and Bridges, Babil Roads and Bridges Directorate, Technical Division, unpublished data, 2024.

4. Energy Resources:

Energy represents the latent capacity of materials to perform work. It is not directly visible, but its effects appear in various forms. In the industrial sector, energy may appear in the form of heat or motive power. When fuel sources are converted into steam energy through direct combustion, the energy is in the form of motive power. Electricity generation combines motive power and heat power, depending on several natural factors, such as rainfall amounts, duration, and rates, as well as the availability of rivers, dams, and waterfalls.

Electric power sources in the governorate are distributed among five stations that differ in type, design capacity, actual production capacity, and location. According to data in Table 3, the design capacity of the five stations is 18,658 megawatt-hours, while the actual production capacity does not exceed 6,197 megawatt-hours, revealing a significant

deficit in electricity production. This shortage negatively impacts all sectors, including agricultural industries.

Data in Table 4 also indicates that the agricultural sector's energy consumption amounted to 23.3 megawatt-hours of the governorate's total consumption. Meanwhile, the industrial sector's energy consumption represents approximately 10.04% of total energy consumption, ranking third after the household sector and government departments.

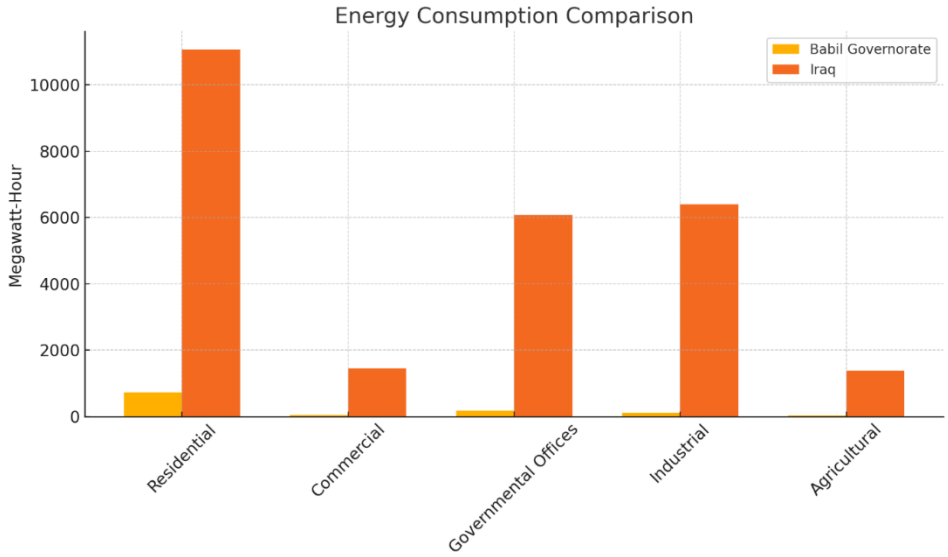
The table also shows that the percentage of industrial electricity consumption in Babil Governorate is approximately 1.67% of the total electricity consumption in Iraq's industry. The same table shows that the percentage of total electricity consumption in Babil Governorate amounted to 4.04% of the total electricity consumed throughout Iraq.

Table 4. Electrical units consumed in Babil Governorate and Iraq by purpose (megawatt-hours).

Category	Babil Governorate	Iraq
Residential	727.2	11072.7
Commercial	37.7	1446
Governmental Offices	171.3	6079.7
Industrial	107.1	6401.3
Agricultural	23.3	1382.6
Total	1066.6	26382.3

Source: Ministry of Planning, Central Statistical Organization, Annual Statistical Abstract (2023-2024).

Figure 4. Electrical units consumed in Babil Governorate and Iraq (megawatt/hour).



Source: Prepared by the researcher based on data in Table (3).

5. Capital:

Modern agriculture and advanced industries require the use of high-cost machinery and equipment, in addition to the need for transportation, the value of the land on which the factory is located, the prices of fuel and raw materials, and the wages and salaries of employees and experts. (Figure 4) Capital in the context of production is defined as the wealth generated by previous labor and used to produce new wealth.

A distinction should be made between two types of capital:

Financial capital, which includes the funds available to finance factors of production. Produced or fixed capital, which includes all tools, equipment, and non-physical means actually used in the production of goods and services.

The size of existing industrial activity is related to the amount of capital employed, whether in cash or in kind.

Table 5. Number and value of loans disbursed by the Industrial Bank, Babylon Branch, to beneficiaries in the industrial sector for the period.

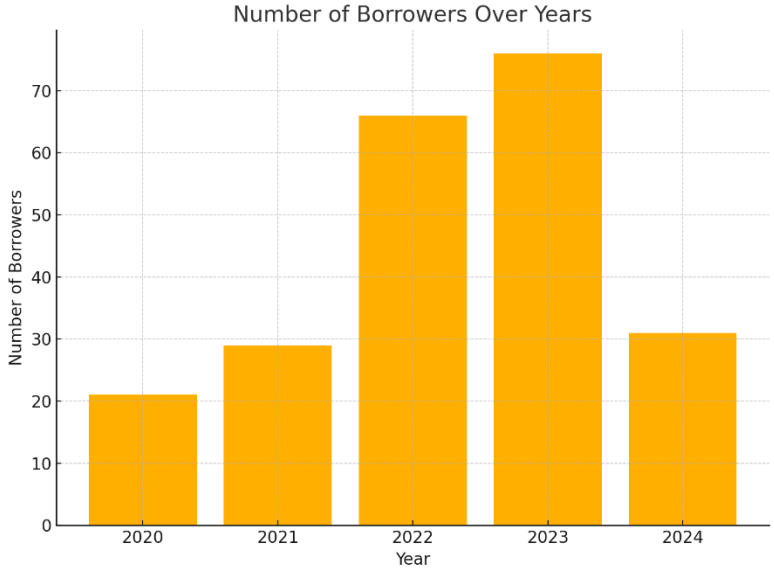
Year	Number of Borrowers	Loan Value (Million Dinars)
2020	21	521.5
2021	29	1177
2022	66	2445
2023	76	2885
2024	31	1100
Total	223	8128

Source: Ministry of Planning, Central Statistical Organization, Annual Statistical Abstract (2023-2024).

Table 5 and Figure 5 show the number and value of loans granted by the Industrial Bank in Babil Governorate to investors in the industrial sector during the period from 2009 to 2013, totaling 223 loans. The data indicate that the value of loans doubled in 2010 compared to 2009, and their number and value doubled again in 2011 compared to the previous year. In contrast, 2013 witnessed a sharp decline in the number and value of loans, to less than half of what they were in 2012.

The figures confirm that the Industrial Bank played an important role in supporting local industry, provided that these loans were actually directed to industrial projects. It was found that some borrowers used the loans for commercial or construction activities rather than investing them in the industrial sector.

Figure 5. shows the number and value of loans disbursed by the Industrial Bank, Babylon Branch, to beneficiaries in the industrial sector for the period from (2020-2024).



Source: Prepared by the researcher based on data in Table 4.

Therefore, it is essential for the Industrial Bank to establish clear controls and monitor borrowers to ensure that loans are actually used in industrial projects. The bank should also work to reduce the interest rate imposed on these loans, in addition to providing other facilities such as extending repayment periods to ease the financial burden on investors.

Section Two - Volumetric Composition of the Food Industries:

The food industry is defined as one of the branches of the manufacturing industries whose inputs rely on materials of agricultural or animal origin. These industries aim to process these materials and make them fit for human consumption for as long as possible, while preserving their nutritional value as much as possible, thus achieving economic benefits that meet human needs.

Food industries occupy a significant position in the national economy and the industrial structure in general. This importance is clearly evident in Babil Governorate, thanks to the abundance and diversity of raw materials resulting from local agricultural production, both plant and animal. The increasing demand for their products, coupled with improved population incomes, has also contributed to their importance. They also

stand out for their ability to provide real job opportunities, in addition to their role in providing a variety of food products in appropriate quantities, in response to public health requirements.

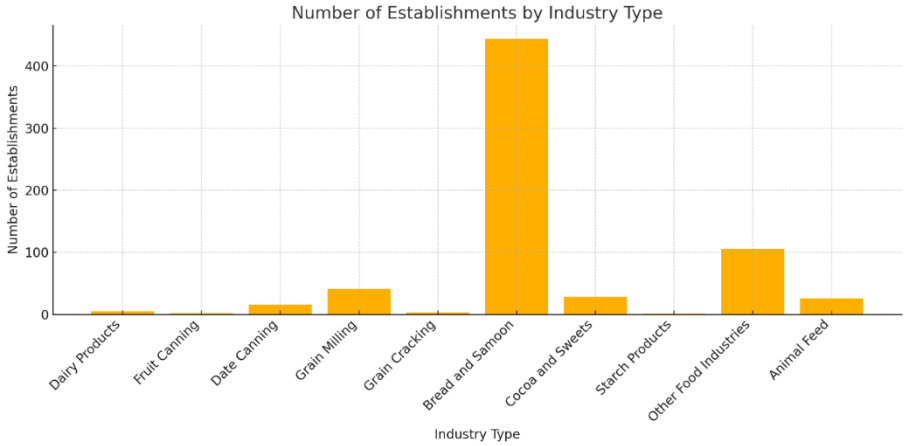
Table 6. Number of food industries that rely on agricultural inputs in Babil Governorate in 2024 AD.

Industry Type	Industry Size	Number of Establishments	Number of Workers	Value Added (Thousand Dinars)
	Large	Medium	Small	
Slaughterhouses	-	2	8	10
Dairy Products	3	-	2	5
Fruit Canning and Preservation	2	-	-	2
Date Canning and Packing	3	5	8	16
Grain Milling	7	31	3	41
Grain Cracking	1	-	2	3
Bread and Samoon Production	-	-	444	444
Cocoa and Sweets Production	-	-	28	28
Starch and Its Products	1	-	-	1
Other Food Industries	1	1	104	106
Animal Feed	-	-	26	26
Total	18	39	625	682

Source: Ministry of Planning, Central Statistical Organization in Baghdad, Industrial Statistics Department, data (unpublished), 2024.

The industrial sector enjoys a recognized status within the United Nations classifications (Ministry of Planning). Table 6 and Figure 6 show the diversity of food industries that rely on agricultural inputs in Babil Governorate, in terms of the number of establishments, size of employment, and value added. The number of food industry establishments in the governorate reached 682 out of 3,991 registered industrial establishments in 2024. These industries were distributed among 18 large establishments, 39 medium establishments, and 625 small establishments.

Figure 6. Number of food industries that rely on agricultural inputs in Babil Governorate in 2024>



Source: Prepared by the researcher based on data in Table 6.

1. Slaughterhouses:

The slaughtering process refers to the cutting and organizing of meat from animals permitted for slaughter according to Islamic law, such as sheep, cows, goats, buffalo, and camels. The animals undergo a pre-slaughter preparation process, where they are left for 24 hours in designated pens that meet health requirements, such as good ventilation and clean water. Feeding is prohibited for 12 hours before slaughter. During this period, veterinary examinations are conducted, and sick or suspected animals are isolated until their safety is confirmed. After slaughtering and skinning, by-products such as hides and wool are utilized.

The number of slaughterhouses in Babil Governorate is 10, according to data in Table 5, divided into two medium-sized facilities and eight small facilities, with no large facilities. Slaughterhouses accounted for 1.5% of the total establishments, while the labor force accounted for 0.1%, contributing 21.2% of the added value.

Slaughterhouses were distributed among the governorate's administrative units. There were two slaughterhouses in Hillah District (one in Hillah Center and one in Al-Kifl), two in Al-Musayyab District (Saddah and Alexandria districts), four in Al-Hashimiyah District (Al-Madhatiyah, Al-Qasim, Al-Markaz, and Al-Shomali districts), and two in Al-Mahawil District (Al-Mashrou' and Al-Nil districts).

Data from Table 7 and Figure 6 show that the governorate's slaughterhouses produced approximately 1,555.6 tons of beef in 2024. Al-Hashimiyah District recorded the highest production rate of 56.9%, while Al-Mahawil District ranked last with 10.3%.

Table 7. Slaughterhouse Production in Babil Governorate in 2024

District	Production (tons)
	Sheep
Hilla	323.1
Al-Mahawil	6.1
Al-Hashimiyah	47.5
Al-Musayyib	18.6
Total	395.3

Source: Ministry of Planning, Central Statistical Organization in Babil, Industrial Statistics Department, data (unpublished), 2024.

Total sheep meat production in Babil Governorate amounted to 395.3 tons, with Hillah district leading the way with 81.7%, while Al-Mahawil district recorded the lowest production rate at 6.1%. Goat meat production amounted to 632 tons, with Al-Hashimiyah district ranking first with 75.1%, while no production was recorded in Al-Mahawil district due to the lack of goat farming.

Buffalo meat production amounted to 200.2 tons, with Al-Hilla district leading with 86.3%, followed by Al-Musayyab district with 27.5%, while no production rates were recorded in the remaining districts. Camel meat production reached 22.2 tons, and its breeding was limited to Al-Musayyib District, with no contribution from other districts.

2. Dairy Products:

This industry specializes in automated factories that convert raw or dried milk into various products such as cream, yogurt, and various types of cheese. Data from Table 6 and Figure 6 show that dairy processing facilities in Babil Governorate were limited to large and small enterprises, constituting 0.7% of the total food industry. The labor force in these enterprises amounted to 0.3% of the total labor force, and they contributed 21.2% of the added value of the food industry.

Despite the importance of the dairy industry from a nutritional and economic perspective, the small number of enterprises indicates an urgent need to support this sector through the establishment of additional large and medium-sized enterprises. Developing this industry is an important factor in enhancing the governorate's economic returns and a major driver for expanding its agricultural industries.

3. Canning and Preserving Fruits and Vegetables:

This industry relies primarily on the agricultural sector to provide the necessary raw materials, contributing to the absorption of surplus agricultural production (League of Arab States, Arab Industrial Development Organization, 2022, p. 6). Food is susceptible to spoilage during transportation and storage due to germs and enzymes, leading to spoilage. Given that agricultural production is seasonal, food processing is an urgent necessity to ensure the continued availability of food.

Food preservation aims to extend the shelf life of food so that it can be consumed outside of the production season. Data from Table (5) and Figure (6) show that fruit and vegetable preparation and preservation facilities in the governorate were limited to only two large facilities, with no medium or small facilities. Food and fruit preservation facilities accounted for approximately 0.3% of the total food industry, while the labor force accounted for 0.9%, contributing 3.1% of the added value of the agricultural food industry. Despite the importance of this industry, the number of facilities is small compared to the size of the local market and its needs. Especially with the development of industry and agriculture, and the increasing population shift toward prepared and canned foods, driven by the increasing number of working women and the lack of time, which has increased demand for these products. This reality represents a real opportunity to support the establishment and expansion of agricultural industries in the province.

4. Date Canning and Pressing:

The date pressing and canning industry is one of the industries for which Babil Province is famous. It relies primarily on local date production, especially Zahdi dates. This industry includes the manufacture of pressed and stuffed dates, the production of molasses, vinegar, and the production of sauce from molasses production waste. Some molasses factories are also adding production lines for the production of sesame rashi.

Most molasses and sweetener manufacturing factories are small. According to 2024 data, the number of large establishments in this field was three, medium-sized establishments six, and small establishments eight. This brings the total number of date manufacturing facilities to 16, representing 2.3% of the total food industry facilities in the province. The labor force accounted for 0.7% of the total workforce, while the value added reached 5.5% of the total value added of the food industry.

Given that Babil Governorate is one of the most prominent date producing provinces, there is a significant opportunity to increase the production of dates of various types and shapes by establishing agricultural industries that rely on local production.

5. Grain Milling Industry:

Food grains are one of the most important sources of energy for humans due to their high starch content. Grains have multiple uses, both in their natural and processed forms. Flour is the most prominent of these products, as it is the main ingredient in bread and bakery products.

The grain milling industry consists of facilities that grind wheat and barley to produce flour used in making bread and buns, while the resulting waste is used in the animal feed industry. Most of these facilities are concentrated in Hillah District. The number of grains milling facilities reached 41 out of 682 food facilities in the governorate, representing 6.0% of the total food industry. This industry included 7 large facilities, 31 medium facilities, and 3 small facilities. The percentage of workers in these facilities amounted to 0.9% of the total workforce in the food industry, while contributing 35.4% of the added value of these industries, as shown in Table 6 and Figure 6.

It is evident that the grain milling industry represents a vital sector in the governorate, given its reliance on local agricultural grain production, in addition to imported wheat, which is of higher quality than the local one. The growth of this industry is linked to increased grain production, which enhances the potential for agricultural and industrial expansion and supports the establishment of other agricultural industries in the governorate.

6. Grain Grinding:

The grain grinding industry refers to the processing of paddy grains to produce rice, a staple in the Iraqi diet. This industry lacks large facilities, with the exception of the government-run Hillah mill. The governorate has one large industrial facility and two small mills, making grain grinding facilities account for approximately 0.4% of the total food industry in the governorate. The labor force in this sector accounted for 0.4% of the total labor force, while the value added reached approximately 1.2% of the total value added of food industries that rely on agricultural inputs.

7. Bread and Bread:

Bread, especially wheat flour bread, is one of the most important basic food commodities that people rely on in most countries around the world. Wheat flour bread constitutes the largest consumption of all other grain breads combined. Therefore, wheat is considered one of the most important agricultural food raw materials needed by humans to meet their protein and calorie needs.

The bakery and bread oven industry is classified as a service or community industry. Data from Table 6 and Figure 6 show that all of its facilities are small, with no medium or large facilities. The number of small facilities in this sector reached approximately 444, representing 65.1% of the total food industry facilities in the governorate. The labor force in this sector amounted to 2.6%, and it contributed 23.7% of the added value of food industries based on agricultural inputs.

Given the importance of this industry in meeting daily nutritional needs, and with the population's increasing focus as a result of improved living standards, there is a need to expand the establishment of medium and large industrial facilities to support this vital sector. This also represents an additional opportunity to develop agricultural industries in the governorate.

8. Cocoa, Chocolate, and Sugar Confectionery Industry:

This industry relies primarily on the use of flour, sugar, fruits, and vegetables as flavoring and sweetening ingredients, in addition to sesame and cherries. The production process relies heavily on manual skills and inherited expertise. This industry is characterized by its focus on broad markets.

Data from Table 6 and Figure 6 indicate that Babil Governorate is devoid of large and medium-sized establishments in this field, and is limited to small establishments only. The number of these establishments amounted to about 28 establishments, representing 4.1% of the total food industry establishments in the governorate. The percentage of labor in this sector amounted to 0.2%, while the percentage of added value amounted to about 0.3% of the total added value of the food industries.

9. Starch and its Products:

Al-Hashimiyah District in Babil Governorate is unique in having a starch factory, the only one in Iraq specializing in the production of starch and dextrin, used as primary or secondary raw materials in many industries. This factory represents approximately 0.1% of the total food industry establishments in the governorate. Its workforce comprised 0.2% of the total workforce, while it contributed 1.3% of the added value of food industries that rely on agricultural inputs.

The factory witnessed a significant decline after its privatization and sale to the private sector. This is due to the obsolescence of machinery and equipment and poor maintenance, as a result of the new management's focus on achieving quick profits rather than modernizing production lines. Despite the governorate's production of large quantities of yellow corn, its high prices made it difficult to secure the raw material locally, forcing the factory to rely on imported Turkish corn, in addition to efforts to support the national product.

This industry is of great importance for its role in supporting other industries such as confectionery, pharmaceuticals, and cosmetics, which require renewed attention to

developing and rehabilitating this factory to ensure its continuity and increase its contribution to the local economy. 10- Other food industries not listed:

This group of industries includes gypsum production, coffee roasting, licorice pressing, spice grinding, and vinegar production. According to the data, there were one large establishment, one medium-sized establishment, and 104 small establishments. These industries accounted for approximately 15.5% of the total food industry establishments in the governorate.

The labor force in this sector accounted for approximately 94.5% of the total workforce in the food industry, while the value added accounted for approximately 5.8% of the total value contributed by these industries to the governorate. These figures demonstrate the need to expand the establishment of new large, medium, and small industrial establishments to meet local market needs and enhance the role of diverse agricultural industries in the governorate.

11. Animal and Poultry Food (Feed) Industry:

The animal feed industry refers to the production of animal feed using certain types of grains, such as barley and yellow corn, or by utilizing waste from other food industries, such as grain milling bran, corn starch production waste, date pressing waste, and molasses. Data from Table 6 and Figure 6 show that feed establishments were limited to small establishments only, with no large or medium-sized establishments. The number of these establishments reached 26, representing 3.8% of the total food industry establishments in the governorate.

The labor force in this sector accounted for approximately 0.1%, while the value added accounted for approximately 1.7% of the total value added of the food industry. This percentage of establishments is insufficient to meet the governorate's feed needs, especially with the increased demand during the winter and the expansion of calf-raising activity. The fish farming sector, particularly pond fish, also relies primarily on manufactured feed. Babil Governorate ranked first in Iraq in pond fish farming, which reinforces the need to expand the establishment of new feed manufacturing facilities and support the growth of agricultural industries in the governorate.

4. Conclusion

Through the previous presentation of the study of the size structure of the food industry in Babil Governorate and the clarity of the potential, we were able to reach several conclusions and recommendations.

First Conclusions:

The study showed that Babil Governorate possesses most of the natural resources necessary for industrial production, such as a relatively flat surface and a favorable climate, with the exception of occasional scarcity or infrequent rainfall.

The results indicated that human, demographic, and economic resources constitute a fundamental pillar in supporting industrial activity in the governorate.

Babil Governorate possesses suitable potential for the establishment and establishment of many branches of the food industry, benefiting from its central geographical location among the governorates of the Middle Euphrates and its proximity to Baghdad. In addition, its flat surface facilitates ease of transportation, agriculture, and settlement, as well as the diversity of its agricultural inputs.

The study demonstrated a direct relationship between agricultural production and industrial production, indicating the availability of real opportunities for developing agricultural industries in the governorate based on plant and animal inputs. Data analysis revealed a moderate direct relationship between the volume of plant production and the number of industrial facilities dependent on these inputs.

The governorate faces challenges related to agricultural and industrial production. The agricultural sector suffers from water scarcity, high soil salinity, and increased dust storms. Meanwhile, the industrial sector suffers from problems related to raw materials, as local

materials are characterized by poor quality and high prices compared to higher-quality, less expensive imported materials.

Second - Recommendations:

Strengthen agricultural activity in the governorate and increase the productivity of agricultural land, while working to convert agricultural surpluses into industrial production to support agricultural-industrial development.

Develop the transportation network and means of communication in the governorate and Iraq in general, given their important role in supporting the growth of agricultural and industrial activities.

Establish industries that support agricultural activity, such as the production of pesticides, fertilizers, veterinary medicines, pesticide spraying equipment, tractors, modern irrigation equipment such as sprinklers and drip irrigation, and plastic covers.

Adopt a government policy aimed at developing local industries by reducing or prohibiting the import of goods similar to local industrial products, imposing customs duties on imported goods, and providing support and encouragement to local industries. Work to rehabilitate and invest in the Alexandria Industrial Complex, as one of the largest industrial complexes in Iraq, with a focus on rehabilitating its buildings and industrial facilities to enhance its production activity.

Establish new industrial sites distributed across the governorate's various districts, such as Al-Hashimiyah District, given the availability of agricultural production and the labor necessary to support industrial activity.

Establish new industrial hubs outside the Hillah city center, with a proposal to establish an industrial hub towards Al-Mahawil District to Support Industrial Expansion Outside the City.

REFERENCES

[1] H. Rasool, Geography of Industry. Beirut, Lebanon: Dar Al-Nahda Al-Arabiya for Printing and Publishing, 1986.

[2] H. H. Karim, "Food Industries in Erbil Governorate," M.S. thesis, College of Arts, Univ. of Salah al-Din, Erbil, Iraq, 2001, unpublished.

[3] League of Arab States, Arab Industrial Development Organization, Canning Industry in the Arab World, n.d.

[4] S. T. Al-Najfi and I. O. Hammadi, Agricultural Planning, Development Planning, and Agricultural Policy. Mosul, Iraq: Directorate of Dar Al-Kutub for Printing and Publishing, 1989.

[5] S. Bassis, Scientific Guide to Home Food Production. Palestine: Danish Regional Agricultural Project Printing, Ministry of Agriculture, 2014.

[6] R. R. H. Al-Aidami, "Industrial Development and Its Spatial Trends in Al-Qadisiyah Governorate," Ph.D. dissertation, College of Education for Girls, Univ. of Kufa, Najaf, Iraq, 2016, unpublished.

[7] F. Al-Ghariri, S. A. Al-Salihi, and S. O. Al-Dah, Geography of the Arab World, 1st ed. Amman, Jordan: Safaa Publishing and Distribution House, 1999.

[8] Z. A. Al-Janabi and A. H. M. Al-Shammari, "Food Industries in Babylon Governorate," J. Humanities, Special Issue of the Fourth Scientific Conf. of the College of Education for the Humanities, Univ. of Babylon, 2012.

[9] H. A. Al-Issawi, "Changes in the Processing Industries in Babylon Governorate during the Period (2000–2011) and Their Future Trends," M.S. thesis, College of Education for the Humanities, Univ. of Babylon, Hillah, Iraq, 2015, unpublished.

[10] Al-Tamimi, Industrial Growth in Basra and Nineveh Governorates. Basra, Iraq: Center for Arab Gulf Studies, Univ. of Basra; Mosul, Iraq: Mosul Univ. Press, 1981.

[11] F. O. H. Al-Taie, "Construction Industries in Babylon Governorate," M.S. thesis, College of Arts, Univ. of Al-Qadisiyah, Diwaniyah, Iraq, 2009, p. 45, unpublished.

[12] J. Al-Bakr, Date Palm. Baghdad, Iraq: Al-Watan Press, 1972.

[13] M. A. Al-Samak and A. A. Al-Tamimi, Foundations of Industrial Geography and its Applications. Mosul, Iraq: Directorate of Dar Al-Kutub for Printing and Publishing, 1987.

[14] M. S. Abbas, "Geographical Distribution of Agricultural Industries in Wasit Governorate for the Year 2023," J. College of Basic Education, Al-Mustansiriya Univ., College of Basic Education, no. 125, 2024.

[15] F. M. A. Al-Ruwaih, Natural Land Resources, 1st ed. Kuwait: Kuwait Univ. Publications, 1999.
[16] F. M. Mahdi, "Large Food Industries in Iraq," Ph.D. dissertation, College of Arts, Univ. of Basra, Basra, Iraq, 2006, unpublished.
[17] Ministry of Planning, Central Statistical Organization, Department of Industrial Statistics, Industrial Activity Classification Guide, 2nd ed., 1970.
[18] N. T. Dakhil, "Spatial Distribution of the Grain Milling Industry in Dhi Qar Governorate for the Year 2024 AD: A Study in Industrial Geography," J. Sustainable Studies, Scientific Society for Sustainable Educational Studies, vol. 6, no. 12, 2024.