Journal of Economics and Administrative Sciences (JEAS)

Available online at http://jeasiq.uobaghdad.edu.iq

Industries Based on the Petrochemical Industry in Iraq-Plastics Industry as a Model

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Received:30/4/2023 **Accepted: 30/5/2023** **Published: 1/9/ 2023**

Abstract

This study came to discuss the subject of industries dependent on petrochemical industries in Iraq (plastic as a model) during the period 2005–2020, and the study concluded that the plastic industries contribute to areas of advancement and progress and opportunities to deal efficiently with the challenges posed by the new variables, the most important of which is the information revolution. communications and trade liberalization, and this is what contributes to the competitiveness of these industries. And because the petrochemical industry in Iraq has an active role in establishing plastic industrial clusters and clusters of micro, small, and medium industries by providing the necessary feedstock for these industries in various fields and industrial sectors, such as plastic packaging industries and building, And the industries feeding the automobile industry, textiles, machinery and equipment manufacturing, and other industries, depending on the availability of various petrochemical products and feedstocks. The study recommended that developing strategies and approving medium and long-term development plans through which results can be benefited from in the field of developing small, medium and micro industries, as well as coordination and cooperation between agencies. , and the bodies concerned with the development of small and medium enterprises in the Arab countries, and encouraging the establishment of projects for small and medium industries, and reviewing policies and legislation, and updating them to ensure facilitating financing procedures and encouraging and stimulating the participation of the private sector in the development of small and medium enterprises in addition to the government sector.

Paper type: Research paper

Keywords: Feedstock, Plastics, Manufacturing Strategy, Industrial Development, Resins, and Polymers

1. Introduction

The petrochemical industry involves the conversion of petroleum products into materials used in various other industries, including the chemical and plastic industries. The industry relies on petroleum derivatives as its primary raw material, hence the name petrochemicals," derived from the words petroleum and chemistry. The origins of the petrochemical industry date back to 1920 in the United States, when there was a search for ways to market huge quantities of gas deposits and waste generated during oil refining. However, the industry's actual growth can be attributed to the Second World War, when there was a shortage of two essential materials for war production, namely rubber and explosives. In most countries, such as Iraq, the petrochemical industry is one of the main pillars on which their economic diversification relies. This helps to reduce reliance on fluctuating oil revenues and optimally exploit hydrocarbon resources. The plastic industry is considered one of the most advanced industries, and the development of many sectors can be attributed to the development of the plastic industry and related industries. This has led to the development of many aspects of daily life, thanks to the use of various types of plastic materials.

1.1 Literature review

There are many studies on this subject, and I relied on some of them, such as:

Al-Obeidi (2012) analyzed annual and monthly reports related to the financial and economic analysis of the petrochemical industries in Iraq for the period 2000–2008, and the study concluded that the petrochemical industries have strategic importance in generating wealth and diversifying national income sources due to their vital role in the growth and development of all economic and social sectors. However, despite Iraq's possession of refining capabilities that allowed it to launch advanced petrochemicals in the 1970s, it has been subjected to numerous wars and economic sanctions over the past two decades, which have thwarted all previous development efforts. To differentiate Iraq, it possesses highly competitive capabilities in global markets thanks to a number of relative advantages available, including gas supplies and an economic workforce, in addition to low production and marketing costs per tonne compared to European countries.

Al –Mashhadani (2015) reviewed some reports in order to analyze them and make projections to clarify the future of the petrochemical industry in the Gulf Cooperation Council (GCC) countries and Iraq, and it concluded, the petrochemical industry in the Gulf Cooperation Council countries began to emerge, with natural gas being used in power generation, desalination, and various industries, particularly petrochemicals. The availability of natural gas as a key input allowed for the construction of petrochemical manufacturing units, which quickly grew and flourished in all GCC countries, particularly Saudi Arabia, where its complexes producing a wide range of intermediate petrochemical products became economic and sustainable development engines with social and economic dimensions.

Al-Jaifari (2016) presented the industry's approach, which is an important activity that possesses freedom and flexibility in transitioning towards geographical excellence to achieve desired development, and concluded that industry is an important activity that possesses freedom and flexibility and This dynamic flexibility depends on economic foundations that contribute to the emergence of regional patterns of industry in terms of their concentration or dispersion in the geographical space in which the production factors operate to draw the economic map for place development. And There are location factors that lead to industrial clustering by attracting industries to each other, as well as site localization factors represented by energy sources, water, transportation, and the workforce. A factory in an area may represent a raw material for another factory, and here the industrial localization components are formed through the raw material of the other factory, which supplies its production as raw materials for nearby factories. Several industries may arise in the location alongside pre-existing industries, working with them through industrial linkages. This linkage creates an industrial pole in the desired location for development.

Shehab (2019) identified the current situation of the petrochemical industries, determined ways to reduce the obstacles and challenges facing Iraq, and established policies and mechanisms necessary to develop the petrochemical industry. He presented a set of conclusions, the most important of which is that the design capacity of the current petrochemical industries in Iraq does not align with the aspirations of the national economy, and concluded that the petrochemical industries are one of the most vital and strategic industries in Iraq due to the availability of primary resources and their easy incorporation into many advanced products. This is a crucial foundation for all other economic and industrial fields. It is necessary to identify the current reality of the petrochemical industries as well as future challenges and obstacles to reduce these challenges.

The research problem focuses on how the petrochemical industries, particularly the plastic industry, can enhance the level of industrial development by presenting the reality of the Iraqi industry, where these industries face numerous challenges that have reduced their economic importance and role.

The research objectives are as follows:

1. To identify the reasons for the lack of development in the petrochemical and plastic industries in Iraq.
2. To highlight the current and future challenges facing the plastic industries in Iraq.
3. To develop policies and mechanisms necessary to promote the petrochemical and plastic industries in Iraq.
4. To present Arab experiences for the purpose of benefiting from them and applying them to catch up with global development.
5. To shed light on the importance and role of plastics in industrial development.

2. Material and Methods

2.1 Hypothesis of the research

Assuming the existence of advanced petrochemical industries in Iraq in terms of technology, it will lead to the establishment of advanced dependent industries such as the plastic industry, which possesses competitive capabilities in both local and international markets, in addition to achieving a high added value that promotes industrial development.

2.2 Petrochemical and Plastic-based Industries and Industrial Development (Conceptual Introduction)

2.2.1 Petrochemical Industries Structure - Origins and Development

The petrochemical industries are one of the pillars of the park's strategy, after which it begins to enjoy the comfort of a commercial and residential complex. Specialized investments in the economic field. And that the term petrochemical industries" means "all industries that depend on natural oil derivatives and raw materials for the production of chemically manufactured materials," chemicals named by this name to prove their origin as petroleum materials. It is the constituent materials of petroleum (oil), which are structured products of the chemical industry, industrial products, very limited natural coal, and organic products at present. The products that were spread in the industrial and established environments are the primary products that enter into industries such as silk, rubber, and others (Al-Sammak, 1981), and the petrochemical industry is considered a branch of industry and an intermediate of great and increasing importance in the development of production forces (Boulos, 2012).

The process of industrial restructuring of petrochemicals in industrialized countries was characterized by ease compared to other industries such as iron and steel due to the small number of workers in this industry and also the existence of wide possibilities for the entry of relevant companies into the manufacturing industries, i.e., industries that use petrochemical materials, and to enter into the production of these specialized materials such as solvents, resins, fuels, plastics, etc. It is important to mention that the petrochemical industries are represented by the high and growing importance of raw materials at the cost of production, as the cost of hydrocarbon raw materials represents a large proportion of the total cost of production, whether

used as inputs or fuel, and therefore the prices of hydrocarbons and their availability are among the main factors in determining the economics of the petrochemical industry (Al-Hassani, 2008). The process of manufacturing petrochemical materials takes place in three production stages, and each stage produces different materials. Below is an overview of these stages and their names:

1. Basic petrochemicals

Seven organic materials constitute what is known as "basic petrochemicals" or feedstocks, which are considered building blocks for many intermediate petrochemical products, which in turn are converted into final products for individual or industrial consumption, which are manufactured based on oil derivatives such as naphtha and natural gas, and they are considered among the building blocks. The basis. Feeds are classified according to their chemical nature into three groups: (The Economics World Magazine, 2010).

a- Alcohols: This group is represented by ethanol and methanol, which is the second-largest derivative of methane by volume.

Olefins are linear unsaturated hydrocarbons that include ethylene, propylene, and butylene (including butadiene).

b- Aromatics are unsaturated cyclic hydrocarbons, including benzene, colouring, xylene, and paraxylene.

2.Intermediate petrochemicals

These petrochemicals represent a link (intermediate) or the connecting link between the basic petrochemicals and the final petrochemicals. Their composition differs from the basic materials. They are commonly called petrochemicals. They are like basic products produced and marketed in large quantities for specific consumers to be used as raw materials for other manufacturing processes. Therefore, their marketing strategies are specific and linked to the global market situation. In terms of prices, its most famous products are ethylene glycol, styrene, and polyvinyl chloride, and its marketing is subject to the following factors:

Securing its supply to the consumer Competitive price.

It is clear from this that the need for a foreign partner to market these products is not necessary. On the contrary, the industrialized countries often impose on the Arab countries to participate in such projects to ensure obtaining these products at acceptable prices and to ensure continued supply (Unified Arab Economic Report 2004, Fund Arab Criticism).

3. Final petrochemicals

Final petrochemicals are produced directly from basic petrochemicals such as polymers of ethylene and propylene or through intermediate products such as resins and polymerization materials such as polyethylene, polypropylene, polyvinyl, and others. These products are then converted into consumer or industrial final products such as plastic products, paints, detergents, and insulating materials. Plastic products are among the most the finished products are widespread and consumed, and their production depends on polyethylene (low and high density) in the first place, followed by polyvinyl chloride (PVC), then polypropylene, and polystyrene (e). (Al-Sammak, 1977).

4. In addition to classifying petrochemicals according to their manufacturing stages into basic, intermediate, and final groups, the last link of which represents the raw material for manufacturing industries whose products exceed 300, Petrochemicals are also classified in terms of their nature into commodities characterized by general commercial specifications that are rarely changed and performance petrochemicals, which are products that are manufactured with special specifications according to demand and are usually subject to continuous research in order to improve their performance. Some performance petrochemicals may have a distinctive character due to their critical specifications, and then they are called special petrochemicals, as their production is subject to a patent and is linked to the product strategy. Then, it achieves a greater return than that achieved by commodity petrochemicals, thanks to the increasing demand

of developing countries for them, and they have come a long way in their industrialization. (Gulf Organization for Industrial Investments, 1995).

2.2.2 The development of the petrochemical industry in Iraq

Iraq sought to establish a petrochemical industry with highly competitive capabilities in the global markets thanks to a number of advantages, including the availability of cheap raw material, which is associated with natural gas, the availability of manpower, and its possession of all the elements for the emergence of this industry. Low operational efficiency and low production volume, and in general, the 1980 war led to a significant decline in production rates, and none of the industries could achieve high exploitation rates except for the agricultural blankets industry, which does not need major complications in the production process, in addition to the economic blockade that was applied. In Iraq after 1990, the petrochemical industries were isolated from the outside world. And the sufficiency of the local market, which led to a decrease in the rates of exploitation of production capacities, as can be noted by the decrease in production capacities and the suspension of some factories. (Al-Rifai, 2014).

Table (1), note the decrease in the exploitation rate during the period 2005–2020. Although the petrochemical industry was able to re-upgrade its production capacity at the beginning of the year 2000, the production capacity reached 25% in 2001 and 26% in 2002 until it occurred The war of 2003 and which caused great destruction in the petrochemical factories led to the stoppage of most of the factories, such as PVC, VCM, and coloring granules, and the work of other factories with marginal energies, in which the exploitation rate ranges from 1% to 3% for the years 2007–2010, as can be seen in Table 1. The General Company for Petrochemical Industries has stopped working completely since 4/28/2011 due to not supplying the required quantities of gas, as the plant needs 50 fuels for initial operation, and the lack of electric power (Qaraish, 2013).

Table (1) Quantities and percentages of petrochemical production in the General Company for Petrochemical Industries For the period (2005-2020) Tons

odaS	hlorineC	inylV Chloride onomerM	Low Density Polyethylene	High Density Polyethylene	Ethylene	Year
4247	4177	/	30223	15438	57283	2005
%5.1	%9.9	/	%50.0	%51.0	%43.0	
4200	4226	/	34283	13802	60319	2006
%5.0	%10.0	/	%57.0	%46.0	%45.7	
2905	3127	/	18425	9289	35070	2007
%3.5	%7.4	/	%31.0	%30.3	%26.8	
627	176	/	1423	792	1392	2008
%0.8	%0.4	/	%2.4	%2.6	%1.1	
790	119	/	2757	280	1043	2009
%0.9	%0.3	/	%4.6	%0.9	%0.8	
445	499	/	6366	261	1718	2010
%0.5	%1.2	/	%11.0	%0.9	%1.3	
109	109	/	8366	587	1544	2011
%0.1	%0.3	/	%14.0	%2.0	%1.2	
/	160	/	576	/	406	2012
/	%0.4	/	%1.0	/	%0.3	

55	277	/	7050	/	1498	2013
%0.1	%0.7	/	%12.0	/	%1.1	
53	221	/	6050	/	1403	2014
%0.1	%0.5	/	%10.0	/	%1.1	
55	310	/	7787	603	6021	2015
%0.1	%0.7	/	%13.0	%2.0	%4.6	
50	276	/	2347	893	/	2016
%0.1	%0.7	/	%3.9	%3.0	/	
55	277	/	7050	603	/	2017
%0.1	%0.7	/	%12.0	%2.0	/	
50	275	/	2347	893	/	2018
%0.1	%0.7	/	%3.9	%3.0	/	
55	310	/	7787	603	/	2019
%0.1	%0.7	/	%13.0	%2.0	/	
51	272	/	2347	893	/	2020
%0.1	%0.7	/	%3.9	%3.0	/	

Source: Republic of Iraq, Ministry of Industry and Minerals - Central Statistical Organization, 2020 .

It is also noted a decrease in the indicators of the development of the gross domestic product of the petrochemical industries as a whole and industries depend on them , Where the petrochemical industry witnessed a decrease in its contribution to the gross domestic product due to Iraq's dependence on the extractive industry, which has become the main component of the gross domestic product, and the weak interest in the manufacturing industry, including industries dependent on petrochemicals, as a result of the situation that Iraq witnessed from multiple wars and the economic blockade before 2003 Then the deterioration of the security situation after 2003 and the lack of a successful administration capable of managing financial surpluses in some years and directing them towards building an advanced industrial base. In addition, many political, economic and legal factors that contributed to the failure to raise the ability of this industry's contribution to the gross domestic product, which also means The low percentage of the contribution of dependent industries to the gross domestic product as one of its constituent branches. And that the highest contribution percentage of the petrochemical industry in the manufacturing industry is (34%-31%) in (2005-2006), after which the percentages decreased and ranged between (1-18)% during the period (2007-2020). As for the percentage of the contribution of the petrochemical industry, the highest percentage It achieved it (0.465%) of the GDP in 2006, and it began to decrease until it reached zero, This in turn affects the rest of the industries that depend on petrochemicals as their main factor, including the plastics industries, as shown in the following table (2):

Table (2) The production value of the petrochemical industry and dependent on it in Iraq and the percentages of its contribution to the industrial and gross domestic product for the period (2005-2020)

(In billion dinars)

Percentage of petrochemical industry contribution to the manufacturing industry %	Contribution of the petrochemical industry to the GDP, %	Production value of the petrochemical industry and relied upon	output value of the industry transformative	Gross domestic product at current prices	year
34.66	0.315	158.065	455.995	50213.700	2005
31.48	0.465	191.974	609.807	41314.569	2006
18.07	0.275	112.867	624.346	41022.927	2007
2.64	0.027	8.044	303.724	29585.789	2008
0.93	0.016	8.732	937.681	53235.359	2009
1.68	0.022	16.365	971.031	73533.599	2010
1.41	0.022	20.821	1473.218	95587.955	2011
0.18	0.003	3.416	1817.914	111455.813	2012
0.81	0.014	21.460	2644.173	157026.062	2013
0.40	0.011	13.930	3411.291	130643.200	2014
0.68	0.016	25.299	3678.714	162064.566	2015
0.09	0.003	5.975	6132.760	217327.107	2016
0.00	0.000	0	6817.592	251907.662	2017
0.00	0.000	0	7288.007	267395.614	2018
0.00	0.000	0	7608.099	258900.600	2019
0.00	0.000	0.007	3915.770	192403.828	2020

Source: Republic of Iraq, Ministry of Planning and Development Cooperation - Central Statistical Organization, 2021.

2.2.3 Plastic Industries - Concept and Origin

Before entering into the concept of the plastic industry as an industry based on petrochemicals, the concept of plastic and its uses will be clarified, as plastic is an organic polymer and a non-biodegradable polymer, most of which contain carbon atoms alone or with oxygen, sulphur, or nitrogen. (Al-Masry et al., 1999).

Polymers are manufactured in petrochemical factories, where these factories convert crude oil into this substance after introducing it in several production stages. Ethylene is one of the petrochemical materials used in the plastic industry, as it is converted into a polymer known as polyethylene, polyethylene, or polythene, which is the most common and used type of plastic (Nofal, 2001).

The plastic industry has entered almost every home, factory, and office. Seats, tables, cutlery, suspended ceilings, wall paint, cars, planes, spacecraft, television equipment, audio-visual recorders, lighting poles, and clothing are not devoid of plastic parts in their manufacture, which makes dispensing with them difficult because plastic industries are the industry of the era in which you invest. There is big money in different countries of the world, rich and poor alike, for the production of synthetic materials, which in turn are used in the manufacture of various

things that no one would have dreamed of in a few years. Which makes us say with complete confidence that we live in the era of plastic, which is an industrial resin produced from chemical reactions of organic materials. (Al-Birmani, 2011)

The plastics industry is closely linked to some modern basic industries, such as petroleum distillation, iron and steel industries, and chemical industries. It is also directly involved in countless other industries, such as metal industries, wood industries, electricity cables, electronics, household appliances, packaging industries, etc. The plastic industry depended on other industries in its historical development and then excelled over those industries in a relatively short period, and the first plastic material appeared in 1868 AD to be produced commercially, which is a material called "Celluloid," which was obtained by "John Willisley Hyatt" from the interaction of camphor with cellulose nitrate in an experiment intended to replace ivory in billiard balls with another material, but this material could not be poured into moulds to form it in the required shape, and it was limited to obtaining it in the form of chips used in the manufacture of the internal structure of car windows and animation films. Since cellulite nitrate is a highly flammable and explosive material, it was later replaced by other plastic materials that are difficult to ignite. (Abdullah, 2019)

The second plastic material appeared in 1909 AD, when Dr. Leo Buckland announced a new resin (alvidol formaldehyde) and called it Bakelite. Products with high heat resistance, such as plugs for frying pans, refrigerators, and electric sockets. A few years passed through a rapid development of the science of manufactured materials, and new technologies accompanying scientific discoveries were born that enabled chemists to present plastic materials with improved, diverse, and increasing properties. (Abdullah, 2019: 56)

As for the manufacture of plastics, it refers to the process of obtaining the resin from its primary raw materials (mainly petroleum). This is done by large companies with long-term investments that depend on their work in petrochemical factories, where they have modern research laboratories and specialized scientists to produce various types of resins in standard forms such as powders, granules, sticks, and liquids (Alshehrei, 2017).

As for the second type of plastic industry, which is the final product, it is the process of forming resins into a final product suitable for daily consumer use. The method of production used in manufacturing varies greatly; therefore, the size of the institutions working in the field of obtaining the final product varies greatly. Some of them are huge institutions that manufacture machines and moulds (such as in America, Germany, and Japan), and other smaller ones manufacture moulds only in their own workshops, as happens in most plastic factories in In developing countries, there are also many production units (workshops) in which they operate the final product after obtaining the resin, the machine, and the mould from outside sources. In this field, companies have appeared that rent the required mould for a limited period to these small workshops (Austin 2018).

2.2.4 The reality of the plastic industry in Iraq and its development

The plastic industry is considered one of the necessities of life in any country, including Iraq, as it advances the material structure of the country’s economy through the development of the rest of the branches of the economy. Therefore, raising the contribution of this sector to the gross domestic product will allow raising the level of the development process and achieving change and growth in the economy (Abdul Hamid, 2018), and it is known about our local industries previously, which are known for their quality and distinction, and how they enter into competition with imported industries and sometimes prevail, but today studies indicate that 80% of Iraq’s factories have declined due to unequal competition with imported goods, Most of the industrialists withdrew from the confrontation and turned to trade, which led to a rise in unemployment rates, while the remaining 20% of the factories remained operating at half their capacity , and the decline in factory productivity dates back to before 2003, and the reason lies in the poor quality of the raw material (plastic), and the other reason is due to the fact that "competition of imported goods represented by plastic water pipes is the main reason for its closure(Majeed, 2022), And that the plastic industry has been completely absent since the

eighties of the last century because of the wars that passed on Iraq, which destroyed the infrastructure of this local industry, and in the eighties (the Iraq-Iranian war) and the nineties (the economic blockade), and the change that occurred after 2003 had a great impact on the decline of this industry in the public and private sectors and its destruction to a very large extent, reaching more than 95% of the Iraqi production factories and companies, and therefore Iraq lost a lot as a result of the cessation of plastic factories until this time (Nazir, 2020). And the percentage of plastic factories belonging to the private sector amounts to 35 thousand factories, 80% of which are idle, while the factories belonging to the public sector are 76 companies, containing 250 factories that are semi-idled. And that the industrialists were expecting after the change in 2003 to extend a helping hand to them for the advancement of the public and private plastic sectors (Buraihi, 2011), but the exposure of the public sector factories to the process of looting and looting led to double damage, and that the goal of the industrialists was to restore life to these factories and prepare them to absorb the labor force from people with competencies and activate their role in reducing the phenomena of poverty and unemployment, as 20% of the country's population is below the poverty line. This step also aims to reduce the random import of foreign goods and the manufacture of local goods that replace them. The following is a presentation of the most important plastic factories and their work in Table 3:

Table (3) Factories of the General Company for Plastic Industries in Iraq

Factory	The company executing the factory	Design capacity, tons/year
Coloring factory	/	450
agricultural covers	/	15000
PVC factory	EVC/ America	60000

Source: Republic of Iraq, Ministry of Industry and Minerals - Central Statistical Organization 2021.

As for the quantities of plastic produced for the period (2005-2016), it can be clarified as follows:

Table (4) Production quantities of plastic materials estimated in thousand tons in Iraq for the public sector for the period (2005-2020)

years	polyvinyl chloride	agricultural covers	coloring granules	Total
2005	100	12813	180	124461
	%0.2	%85.0	%9.5	%25.0
2006	227	10581	345	127983
	%0.4	%71.0	%18.0	%26.0
2007	179	1078	469	70542
	%0.3	%7.2	%25.0	%14.0
2008	/	272	50	4732
	/	%1.8	%2.6	%1.0
2009	/	148	/	5137
	/	%1.0	/	%1.0
2010	/	338	/	9627
	/	%2.3	/	%2.0
2011	/	413	/	11128
	/	%2.8	/	%2.3
2012	/	422	/	1564
	/	%2.8	/	%0.3
2013	/	750	/	9630
	/	%5.0	/	%2.0

2014	/	426	/	8153
	/	%2.8	/	%1.7
2015	/	850	/	15626
	/	%5.7	/	%3.2
2016	/	485	5	4056
	/	%3.2	%0.3	%0.8
2017	/	470	3	4010
	/	%3	%0.2	%0.6
2018	/	430	2	3020
	/	%2	%0.1	%0.3
2019	/	486	1	4056
	/	%3.2	%0.3	%0.8
2020	/	%1.8	%2.6	%1.0
	/	148	/	5137

Source: Republic of Iraq, Ministry of Industry and Minerals - Central Statistical Organization 2021.

It can be said that the development indicators of the plastic industries are very weak, as shown in the previous table, where the data showed that the production of agricultural covers from 2005–2007 ranged from 12813–1078 thousand tonnes, while the production of polyvinyl chloride flourished in 2006, reaching 227 thousand tonnes. As for colouring granules, it also flourished in 2007, reaching 469 thousand tonnes, and production declined in subsequent years (Jacob, 2012). This indicates the need to work to advance the status of this industry and increase its exports to achieve an economic return that helps the development and prosperity of the industry.

2.2.5 the contribution of the plastic industry in Iraq

In fact, the plastic industry in Iraq did not contribute to the domestic, gross, and industrial products, the number of workers, or the added value, even if there were small percentages, as they do not constitute anything of prosperity, and this is due to the deterioration of the industrial sector and neglect of it since 1990 until now, until it reached the point of complete paralysis and most of the factories in the sector stopped. This led to the country relying heavily on imported goods, which increased the unemployment rate. Therefore, the national industry was negatively affected, and the country began to import everything, which caused the killing of the plastic industry and an increase in the number of unemployed, who represent fertile ground for terrorist groups that threaten the stability of national security due to the absence of the strategy and its failure to implement it. A major reason for the deterioration of the plastics industry (Albatat, 2017)

There are many industrial bases in Iraq that may lead to activating the production process, which will be a very important focus for supporting small and medium industries, including plastic industries, and that the absence of a strategy and its failure to apply it to various economic fields, including getting rid of unemployment, economic development plans, eradicating poverty, and that the mechanisms are clear, which is the need to separate politics from the economy," stressing the need to solve the electricity crisis, which is the basis for the process of economic development in general and industrial development in particular (researcher's opinion).

2.2.6 Challenges facing the plastic industry in Iraq

Iraq suffered from the weakness of the plastic industry for several reasons, including the lack of state support for plastic factory projects with a high-tech component and the failure to secure a balanced development between the industrial sector and the plastic industry. Likewise, the lack of support for the private sector to establish plastic factories

The economic situation in Iraq is characterized by deterioration in general, and the plastic sector in Iraq has not developed over the past years and until today, and it is in continuous decline due to the failed policies and procedures followed, which weakened the development of the industrial sector in its various branches. The period before 2003 led to the imposition of the international embargo on Iraq, which led to the destruction of the industrial structure in Iraq, and the plastic industry in Iraq suffered from the lack of raw and intermediate materials, the difficulty of obtaining spare materials, and the backwardness of the technology used due to the failure to keep pace with the technical and technological developments in the world (Majeed, 2022). After 2003, as a result of the economic policy implemented by the occupation authority and successive governments after that, the Iraqi market was flooded with various plastic commodities imported from abroad, which have better competitive advantages than local commodities and are sold at a cheaper price than Iraqi commodities, which led to the marginalisation and disruption of many plastic industries (Al-Mahdawi and Amin, 2012). Also, the weakness of the financing resources allocated to this sector, the dominance of administrative corruption, misplaced money wasted in a way that is not commensurate with the following industrial plan, technical weakness, and the lack of skilled cadres due to the weakness of the means of training and development of cadres and keeping pace with the technological development followed by the rest of the countries for this Industry, lack of electric power, poor equipment, and their obsolescence, which prevents them from succeeding and affects the country's economy.

Among the other problems facing Iraq is the problem of plastic waste, which is the most harmful environmental problem that countries pay great attention to due to its harmful impact on public health and the environment as well as its social and economic effects. The rehabilitation of these aspects costs the country huge sums, as does the continued increase in the production of plastic waste. An inevitable result due to the increase in population, the rise in the standard of living, and the enormous industrial and technological progress. The quantity and quality of waste generated depend on human activities, lifestyles, and levels of environmental awareness, so the process of getting rid of it has become one of the most prominent problems facing cities and human gatherings due to the dangers that this waste poses to the environment and its natural resources. And on human health and safety (Al-Mahdawi and Amin, 2012).

And that the process of sorting plastic waste is considered to have an economic return that leads to raising the standard of living for the individual and the national income, raising the environmental and health level, eliminating the phenomenon of improper and unhealthy solid waste collection, and preventing the spread of random dumping of solid waste, which leads to the spread of diseases and epidemics and the aesthetic distortion of the environment, and that The per capita daily production of waste in the city of Baghdad has reached 0.63 kg for the year 2006, and with the passage of time the plastic waste has reached 4.0%, bringing the daily production of waste to 0.74 kg in 2010 and it is on the rise as shown in the table according to the data obtained from the source (5).

Table (5) The amount of waste removed and the amount of plastic waste generated per capita by governorate, except for the Kurdistan region, for the years 2012 and 2016

City	Number of population served by waste collection service / million	Amount of waste removed (ton/year)	Amount of waste removed (ton/day)	Amount of waste removed (kg/year)	Amount of waste collected (kg/day)	Amount of waste generated per capita (kg/day)
Baghdad Municipality/2012	5,071,180	2,584,776	7,082	2,584,776,000	7,081,578	1.4
outskirts of Baghdad / 2016	1,725,475	284,540	780	284,540,000	779,562	0.5
Baghdad Municipality/ 2012	576747101	3,788,951	10,380.7	3,788,951,000	10,380,688	1.8*
outskirts of Baghdad (2016)	8567505	522,337	1,431.1	522,337,000	1,431,060	1.7*

Source: Baghdad Municipality - Central Statistical Organization 2017

The sorting process by recycling solid waste and making use of plastic waste contributes to preventing the occurrence of environmental, economic and social disasters in our country, so the trend has become towards exploiting this unknown wealth in the production of useful raw materials and alternatives to energy and reducing environmental pollution, especially in some countries that suffer from security stability And a politician (Abbas et all, 2012), where the waste sorting and recycling plant in the Mahmoudiyah district, which is located geographically in the Yusufiyah district and within the administrative borders of the Mahmoudiyah district, is considered one of the leading factories in the field of waste sorting and recycling, as it is The first laboratory specialized in waste management in Iraq, despite the difficulties faced by the management of the plant, as the administration lacks an administrative structure and central authority in managing its affairs, as (55-60) people work in the factory distributed among the administration of the factory, workers in the field of waste recycling, drivers of machinery, technicians, and guards And despite the increasing quantities of solid waste produced annually, reaching 9,515,657 tons / year in 2016 in all governorates except for the governorates of Mosul, Anbar, and the Kurdistan region, which differed between (plastic,glass, paper materials, organic materials) (MOPADC,2016), The basic processes for its management, which include collection, transportation, sorting, treatment, recycling and final disposal, also lack strategies and plans with unclear criteria for dealing with these wastes and the resulting environmental pollution. Facing the process of waste management is the lack of complete data on the quantities, characteristics and rates of disposal of this waste, as well as the existence of a shortage of trained and qualified cadres.

3. Discussion of Results

The following results were discussed In order to enable the plastic industry to regain control of its products and overcome the challenges previously mentioned and reduce it, it is necessary for the state to adopt an integrated industrial policy for this industry based on a clear development strategy, and among these means:

i. Ensuring state support for plastic factory projects with a high technological component and large financing requirements of strategic importance.

ii. Supporting plastic industrial projects and laboratories belonging to the state, rehabilitating them, reforming them administratively and economically, and advancing them to contribute effectively to the development of the national economy.

iii. Encouraging the exploitation of manufacturing industries inside Iraq, whose products constitute inputs for the plastics industry.

iv. Work to ensure a balanced development between the industrial sector and the plastic industry.

v. The state adopts the establishment of modern industrial cities with infrastructure and supplies of basic services that industrial activity needs, such as energy, water, and others, to establish various industries, including plastic industries.

vi. Giving the necessary attention to small and medium plastic industries, special attention to small producers, and helping them to advance their economic projects due to the role that they can play in the areas of employment and vocational training, in increasing production and satisfying part of the needs of the local markets for various plastic products.

vii. Supporting and reassuring the private sector by establishing a stable legal, administrative and financial structure and granting it facilities and appropriate forms of protection for specific periods so that it can upgrade its plastic products to the level of external competition.

viii. Supporting the Industrial Bank for plastic industry projects by financing these projects and creating new financing sources for financing and lending to industrialists on soft terms.

ix. Reconsidering the geographical distribution of plastic industrial projects in order to avoid the noticeable disparity in the levels of development of geographical regions, and to achieve a balanced development that allows ensuring justice and rationality in development and its fruits.

x. Preserving, nurturing and encouraging technical cadres and skills, and working to attract cadres and make maximum use of them in the process of developing the plastic industry.

xi. Reconsidering current laws and regulations in order to create an appropriate investment environment, aiming at attracting expatriate Iraqi capital, and enabling the plastic industry to fully open up to the developed world.

xii. Training and qualifying Iraqi industrialists in various fields and to follow modern administrative methods through participating in international and regional exhibitions and attending seminars held by organizations concerned with industrial affairs.

xiii. Radical treatment of electricity and its continuous provision. There is no industry without electricity.

In order to achieve the possibility of benefiting from the plastic industrial renaissance in the country through the acceleration of the implementation of the above paragraphs and the continuous monitoring of the application of the conditions, the outcome of this strategy will be as follows:

1. Creating a wide number of productive jobs.

2. Contribute effectively to the gross domestic product to 25%.

3. Increasing the annual growth rate of the plastic industries to 14%.

4. Increasing the value-added growth rate in the industrial system to 8% annually.

5. Competitiveness indicators reach a global level.

6. Continuous communication between the plastic industrial system and the Iraqi universities specialized in preparing competencies and research centers, at high rates.

4. Conclusions

i. In order for the petrochemical industries to have an effective position and contribution to the national economy, their development must be based on clear strategies, including the strategy of industrial clusters, which can represent a solution to many problems and obstacles that stand in the way of their development.

ii. Small and medium enterprises can play an important and pivotal role in operating and providing job opportunities if coordination takes place between Arab countries to increase opportunities for developing and diversifying the production base of these enterprises so that they integrate with each other and specialise in production according to the competitive advantage of each country, which enhances the competitiveness of Arab products.

iii. The petrochemical industries play an important role in attracting labour and can also meet the needs of the population and contribute to increasing the added value of products, as these projects have limited capital and lack the need for complex technology, in addition to their

ability to adapt to developments and ease of decision-making. It enables it to play this role in all Arab countries.

iv. One of the most important problems facing the petrochemical industry is the lack of quantities of raw materials (gas or oil derivatives), as the invested quantities of gas are a small percentage and the largest percentage is burned as a result of the lack of laws and legislation in the countries that prevent foreign companies from burning gas. As for the oil derivatives, they are not enough to meet the local need due to the small size of the refineries and their reliance on old technology.

v. The existence of a large technological gap between the Iraqi and global petrochemical industries This gap has emerged as a result of multiple wars, economic blockades, and technology monopolies by developed countries and monopolistic companies. In addition, the Iraqi petrochemical industries were suffering from the backwardness of production methods, the limitation of their products to primary and intermediate petrochemical materials, and the absence of final petrochemical industries, which are characterised by their low prices compared to final petrochemical materials.

vi. The low contribution of the manufacturing industry in general to the gross domestic product is due to the fact that the oil sector dominates all economic activities, as this sector alone contributes 32% of the gross domestic product, and the manufacturing industry sector comes in last place, achieving a contribution of 2%. And the low percentage of the contribution of the petrochemical industry in particular. The reason for this decrease is due to the decrease in production capacities due to the security and political situation and the technological backwardness that the country witnessed, especially during the study period.

vii. Obsolescence and obstruction of laws, legislation, and regulations related to this economic development in general and the petrochemical industries in particular In addition to the absence of the role of qualitative oversight and control over foreign products that compete with the local product, the actual production volume of the petrochemical industries in Iraq is very small and not economically feasible in light of these modest values, despite the importance of these industries on the gross product in some countries where most of the petrochemical complexes and factories suffer from corrosion, technological obsolescence, and poor maintenance and modernization processes, which impede the process of keeping pace with technologies and technological developments as well as the adoption of modern methods in industrial production.

viii. The petrochemical industries in Iraq are faltering due to frequent interruptions, as well as poor coordination between the ministries of industry, minerals, science and technology, higher education, and the relevant regional and central authorities.

ix. The design capacity of the petrochemical industries currently existing in Iraq is not consistent with the aspirations of the national economy, as it constitutes a very small percentage of the gross product.

x. Iraq's lack of infrastructure, due to obsolescence and great technological backwardness compared to the countries that produce these industries and products, the absence of future plans, and the lack of clarity of vision for economic development in general and the petrochemical industries in particular

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الصناعات المعتمدة على الصناعة البتروكيمياوية في العراق ـ صناعة البلاستيك أنموذجا

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Received:30/4/2023 **Accepted: 30/5/2023** **Published: 1/9/ 2023**

مستخلص البحث

جاءت هذه الدراسة لمناقشة موضوع الصناعات المعتمدة على الصناعات البتروكيماوية في العراق ـ البلاستيك كنموذج خلال الفترة (2005-2020) ، وخلصت الدراسة إلى أن الصناعات البلاستيكية تساهم في مجالات التقدم ، وفرص التعامل بكفاءة مع التحديات التي تطرحها المتغيرات الجديدة وأهمها ثورة المعلومات والاتصالات وتحرير التجارة وهذا ما يساهم في تنافسية هذه الصناعات.

ولأن صناعة البتروكيماويات في العراق لها دور فاعل في إنشاء التجمعات الصناعية البلاستيكية وتكتلات الصناعات الصغيرة والمتوسطة والمتناهية الصغر ، من خلال توفير المواد الأولية اللازمة لهذه الصناعات في مختلف المجالات والقطاعات الصناعية مثل صناعات التعبئة والتغليف البلاستيكية ، والبناء, والصناعات التي تغذي صناعة السيارات ، والمنسوجات ، وتصنيع الآلات والمعدات وغيرها من الصناعات ، اعتمادًا على توافر مختلف المنتجات البتروكيماوية والمواد الأولية , حيث تلعب المشروعات الصغيرة والمتوسطة دوراً هاما ومحورياً في التشغيل وتوفير فرص عمل إذا ما تم التنسيق بين البلدان العربية لزيادة الفرص في تنمية وتنويع القاعدة الإنتاجية لهذه المشروعات بحيث تتكامل مع بعضها فأوصت الدراسة بوضع استراتيجيات واعتماد خطط تنموية متوسطة وطويلة المدى يمكن من خلالها الاستفادة من النتائج في مجال تنمية الصناعات الصغيرة والمتوسطة والمتناهية الصغر والتنسيق والتعاون بين الجهات والهيئات المعنية بتنمية المشروعات الصغيرة والمتوسطة في الدول العربية وتشجيع إقامة المشاريع للصناعات الصغيرة والمتوسطة ومراجعة السياسات والتشريعات وتحديثها بما يضمن تسهيل إجراءات التمويل وتشجيع وتحفيز مشاركة القطاع الخاص في تنمية المشاريع الصغيرة والمتوسطة بالإضافة إلى القطاع الحكومي.

نوع البحث : ورقة بحثية *

المصطلحات الرئيسة للبحث: اللقيم , اللدائن , استراتيجية التصنيع , التنمية الصناعية , الراتنجات , البوليمر .

* البحث مستل من رسالة ماجستير