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Analysis of the negative externalities effects of oil extraction in Iraq for the period (2004-2020)

Dr. Lawrence Yahiya Saleh Al- Kubaisi

College of Administration and Economics, University of Baghdad

Email: Lorance_phd@yahoo.com

Eman Ahmed Salman Al-Mafraji

College of Administration and Economics, University of Baghdad

Email: amyeman95@gmail.com

Abstract---This study addressed the negative side effects of oil extraction in Iraq and aimed at analyzing the negative side effects of oil extraction on the Iraqi economy for the period 2004-2020. The research problem stems from the fact that Iraq suffers from negative side effects from oil extraction, which are reflected negatively on the Iraqi economy. The most important finding is that the Iraqi economy's dependence on crude oil production as a primary source of financial resources for the country's administration clearly indicates that Iraq is under the influence of the negative side effects of this process and the emergence of the rentier state with a one-sided economy. The study made recommendations, the most important of which was the need to work on the rational and well-planned exploitation of the depleted resources (oil extraction) to reduce the negative consequences of this extraction, which would contribute to the adoption of the proposed remedies waste the resources that the Iraqi economy suffers from, and then start the road towards sustainable development.

Keywords---Negative Externalities effects, oil extraction, Iraq.

Presentation

The Iraqi economy is still suffering from widespread problems and imbalances. It is still a rentier economy (one-sided) despite the availability of many and varied resources and the existence of good prospects in it. Thus, the rentier oil sector has dominated the economy and all attempts to build the Iraqi economy have been launched by relying mainly on the revenues from oil exports derived from oil extraction. This has resulted in the dominance of rentier oil revenues on the Iraqi economy, and this has resulted in multiple negative side effects, both economic, environmental and social, that have affected the problems Iraq is currently facing,

and because of the negative effects of the negative effects of environmental pollution and pollution of natural resources

First: Importance of Search:

The importance of the research comes in an attempt to identify the negative side effects of oil extraction, which in turn affect the Iraqi economy in various fields, whether on the economic, social, or environmental levels.

Second: Search problem:

The problem of the research stems from the fact that Iraq suffers from negative side effects from oil extraction, which negatively reflect on the reality of the Iraqi economy.

Three: the premise of research:

The research proceeds from the premise that (poor management of the resources derived from oil extraction generates negative side effects)

Fourth: Research objectives:

In order to determine a definitive position on the hypothesis (proof, negation, or modification) the researcher would explain the following:

- 1- Analysis of the main negative side effects of oil extraction in Iraq for the period 2004-2020
- 2- Presenting a strategic proposal to reduce these effects in Iraq

The first Study: Negative side effects of oil extraction

Spillover effects are a common term in economics that refers to the cost or benefit to a third party who is unaware of the production or consumption of a good or service. Externalities are defined as activities that impose costs or coercive gains on others or that do not fully reflect their effects on prices, transactions, or market transactions (Samuelson and Nordhaus, 2006: 384), defined by Rodney and Holly as the benefits and costs of the production or consumption process and borne by a third party that is neither producer nor consumer of the commodity (Mabry and Rodney, 1989: (223) It is noted from the above definitions that they focus on the effect of the activity of one particular economic unit (individual or enterprise) on the well-being of another economic unit. Negative externalities express the damage caused to one party by the activity of the other party without compensation (Meade, 2004: 54.67). Therefore, production processes are accompanied by side effects. As is usual with most human innovations, there are always negative side effects. One of these processes is oil extraction, with negative side effects. Four side effects will be analyzed in detail through the following:

1. Environmental pollution from oil extraction
2. Depletion and waste of natural resources
3. Dutch disease and resource curse.
4. Waste the rights of subsequent generations.

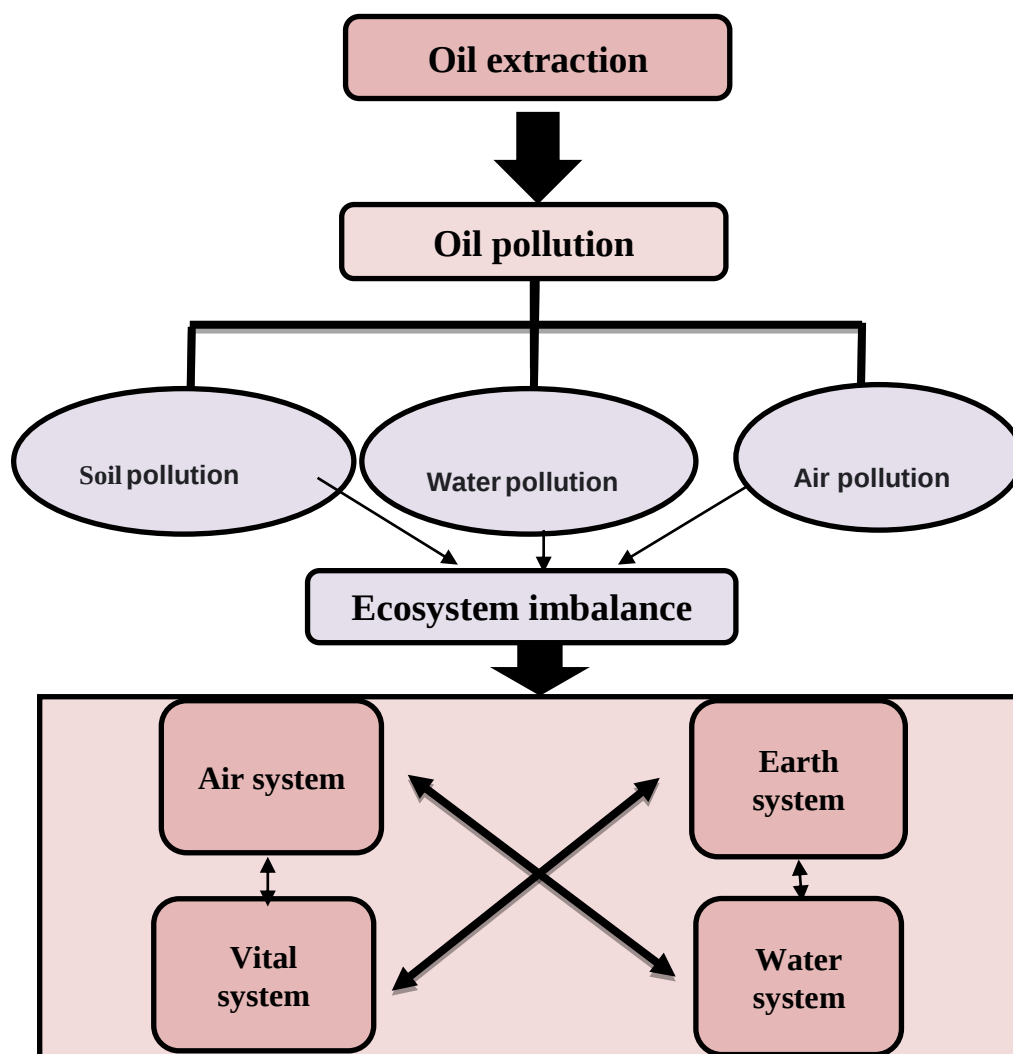
First requirement: environmental pollution from oil extraction

It is true that legislation has addressed the issue of compensating damages resulting from oil extraction, but in fact, it is not sufficient or plagued by a lot of

shortcomings and ambiguities, which require intervention to fill it. This statement, on the one hand, on the other hand, we find that the issue of compensating indirect environmental damages resulting from oil extraction has been overlooked in some laws and legislation, and in the following the most prominent aspects of oil pollution:

1. Air pollution caused by gases emitted in the oil extraction process.
2. Water pollution from oil extraction.
3. Soil pollution as a result of oil extraction.

After all the foregoing, it is clear that oil extraction has negative effects on the ecosystem and thus disrupts it through damage to the components of the ecosystem, namely the land, biological, water and air systems. This can be illustrated by the following scheme:



Scheme (1) the impact of oil pollution on the balance of the ecosystem

The source: by the researcher

Second requirement: Depletion and waste of natural resources (accompanying gas and productive water)

First: Gas associated with oil extraction

Gas combustion and waste are linked to the process of extracting crude oil from oilfields, as gas is an additional resource for the oil field. This process has been ongoing for 160 years. The process of extracting oil is accompanied by the ignition and venting of the accompanying gas. The oil producing companies of the world burn the accompanying gas to maximize their profits by disposing it to produce crude oil at oil wells or oil collection stations through burning it. This is known as "burning", or by releasing it directly into the air. This process is known as "venting", which causes the accumulation of greenhouse gases in the atmosphere. The accompanying gas is classified as the ideal fuel to help the transition towards cleaner, more sustainable and more affordable energy in many countries. Although gas is important for many sectors, such as the source of electricity generation and transport, we find it is also in the petroleum industry, but we find it is the lowest cost to supply and transport companies associated gas without use for a variety of reasons including infrastructure restrictions, lack of financial incentives to capture and process the gas, weak regulatory frameworks or binding contractual rights, the World Bank estimated the amount of natural gas ignited in the oil and gas industry in 2018 at 5.1 trillion cubic feet, equivalent to 770 billion kilowatt-hours of wasted energy, as well as more than 310 million tons of carbon (Sweden, 2020: 2) Oil companies burn the accompanying gas because oil is produced in remote areas far from economic and population centers and needs to be transported and utilized by substantial investments not provided by the energy markets. Given that oil companies focus on their interests, they want the oil produced and see gas combustion as the cheapest way to maximize profits. As a result, the World Bank has put forward an initiative to eliminate the burning of natural gas, which calls for a definitive stop to the burning of associated gas before 2030. At least 150 billion cubic meters of gas worldwide are ignited or wasted each year, adding about 400 million tons of greenhouse gas to annual emissions. This is equivalent to almost all the annual emission reductions that are possible from projects currently submitted under the World Bank's Agreement to stop the burning of oil markets and institutions It has been promoted or put to good uses for humanity and only a few extracted companies and organizations have participated in this initiative ([https:// www.ecomena.org](https://www.ecomena.org)).

Second: accompanying water waste

The extraction of oil is put under the whirlpool of waste produced water. It is financially and economically expensive. Fresh water is injected to extract oil, generating large quantities of waste water during oil extraction. These quantities will increase as the well is produced, as the production of a barrel progresses one of the oil is offset by 5 to 8 barrels of freshwater. These waters are disposed of through re-injection into the ground, which makes it difficult to access and use or evaporate these waters in the basins. This puts the oil-producing countries in the face of real economic and environmental challenges in terms of the cost of producing and treating water, not to mention their severe environmental risks. Countries that do not have fresh water sources of a desert nature suffer from,

leading to the eventual allocation of a very large budget for producing and treating seawater for use in extracting oil, as is the case in Kuwait, where for every 3 million barrels produced daily, the use of at least 15 million barrels of fresh water is offset by the use of a minimum of 15 million barrels of highly polluted water in the State suffering from scarce fresh water sources, with the result that there is no less than 15 million barrels of water pollution in the State suffering from the environmental hazards, in the case of water in the case of the agricultural crops (<https://alqabas.com>). Some countries and stakeholders are asking whether it makes sense to continue wasting water, especially in water-scarce areas, especially after World Water Organization statistics predicted that 33 out of 167 countries will have severe water scarcity by 2040 (<https://www.squ.edu.com>).

Third requirement: the Dutch disease and the resource curse

The concept of the Dutch disease derives from the fact that it is an economic phenomenon usually affecting rentier economies, i.e. those dependent on natural resources (e.g. oil and gold). The Dutch disease is defined as the negative effects occurring in a given economy characterized by the total dependence on the extractive sector or natural resources through its expansion and the disintegration of other sectors of the economy. It is also known as the undesirable negative effects resulting from the sudden discovery of a resource or a natural resource that is essentially extractive (Barder, 2006:3). What is meant by the curse of resources is: "The inverse proportion between increased dependence on natural resources on the one hand, and rates of economic growth on the other" (Carl, 2005:23). The idea that resources could be more of an economic curse than a blessing began to emerge in debates in the 1950s and 1960s about economic problems. The term was first used by the economist Auty Richard in 1993, when he published his book : "Sustained Development in Mineral Economies: The Resources Curse describes how mineral-rich countries are unable to use that wealth to strengthen their economies and how they are growing economically less than countries without abundant natural resources (Anthony, 2016: 161) .

Fourth requirement: wasting the rights of generations

The rights of succeeding generations are wasted on a wide scale. Rights cover many aspects, including economic, political, environmental, cultural, and religious rights. We will therefore focus on wasting the rights of succeeding generations on the depleted resources (oil). The concept of protecting the rights of future generations to depleted natural resources has become an economic requirement and a modern approach, especially as we get up to speed The new millennium, where rentier countries are exploiting their oil wealth on a large scale in terms of increasing their production capacity and increasing their discoveries of oilfields without plans, taking into account the guarantee of the rights of future generations of this important and depleted resource, is that the increase in oil extraction has not been accompanied by any optimal and efficient utilization of this resource. Investment projects that increase financial revenues have not been established, in addition to the fact that they have led to increased economic, social and political problems and burdens. This is a waste of the rights of the generations. The only way that compensates for the consumption of this resource and makes the country richer is to optimize the investment of revenues and

turn. In addition to that, this supplier made a pledge to the oil licensing contracts that the government concluded with foreign companies and the accompanying large financial corruption and waste of public money resulting from the inflated costs of oil extraction (Watch, 2005: 18). The waste of the rights of succeeding generations can be demonstrated by the waste of public money through the imbalance in the state's general budget, through the waste of public revenues and public expenditures, and by ignoring the rights of future generations by exploiting the natural resources around them, without taking into account the rights of those generations, in the absence of a clear vision that contributes to the preservation of rights and limiting the waste of resources.

Second study-Analysis of the negative external effects of oil extraction in Iraq

First requirement: Oil pollution affects Iraq's environmental balance:

Oil pollution has exacerbated the environmental problem in Iraq. The most prominent oil pollutants in Iraq are gaseous oil pollutants, foremost among them carbon dioxide emissions from the burning of the gas accompanying oil extraction operations. This has had environmental losses, as represented by the societal costs resulting from damage to the air, water, soil, and subsequently to man, which have recorded high rates of cancer in the governorate of Basra. All Iraqi fields, especially in the governorate of Basra, are located very close to residential areas, especially in the areas of Al-Zubair, Al-Barjisiyah, Safwan and Qurna. (Abdul-Ridha and Muhammad, 2016: 23). It is obvious that there are potential emissions of gas in oilfields, which is either from the use of chemicals in the extraction, or from the gas produced by the well, or it is a gas associated with crude oil in the unit of gas separation. The accompanying gas represents a tremendous economic wealth that is an important source of energy, and it is a clean source of energy after the removal of sulfur gases, which can be converted to sulfur ore or sulfuric acid. Burning it without the benefit of the energy generated (which is the case in all oilfields in Iraq) represents a great waste of the national economy and a danger to the environment, as the burning process leads to unjustified or feasible emissions of combustion gases, which may contain high-risk compounds such as sulfur, carbon oxides, nitrogen, mercury and other unsulfuric acids, and the increase in the emission of carbon dioxide, etc. (Mohammed, 2014:136), the global cause of carbon dioxide, the main cause of global warming. Iraq's CO₂ emissions reached 49 million tons in 1990 and rose to 73 million tons in 2003, i.e., its annual per capita volume was 2.7 tons in 2003. These emissions rose to 98.9 million tons in 2009. This increase is linked to the increase in oil production and the burning of the accompanying gas (Jaafar, 2018: 87). In Iraq, the amount of burned gas doubled from 6958 billion cubic meters in 2004 to 17374 billion cubic meters in 2020, as can be seen from Table 1. The increase in gas emissions increased steadily during the study period and in increasing proportions, and the highest amount of gas emissions was recorded in 2009 (181.5 million tons), and the only decline was in 2020, due to the decline in oil production as a result of the drop in demand due to the Coronavirus pandemic. This was accompanied by a rise in the high rates of carbon dioxide emissions, which reached 2139.1 billion tons during the study period, a very large

number that requires efforts by the Ministry of Oil, the Ministry of Environment, and concerned parties to find solutions to stop or reduce this pollution.

Table (1) Carbon dioxide emissions from the combustion of gas associated with oil extraction

year	Carbon dioxide gas (million tons / year) (3)	burnt gas Billion m3/year (2)	annual output Million / Barrel) (1)
2004	74.0	6958.0	730294
2005	72.0	6611.0	676423
2006	73.6	6794.9	713594
2007	79.0	7081.5	742890
2008	82.4	7241.0	834677
2009	93.2	7381.0	852700
2010	113.7	7573.0	860700
2011	123.0	9612.0	934000
2012	134.6	12654.0	1054600
2013	146.4	13282.0	1088000
2014	143.7	14012.0	1180844
2015	148.1	16213.0	1367298
2016	167.4	17730.0	1701093
2017	165.6	17843.0	1631185
2018	170.9	17821.0	1610000
2019	181.5	17914.0	1674836
2020	170.0	17374.0	1639459

From Researcher Numbers:1-Column 1: Oil Ministry 2- Column 2: Article (2004-2011) Ministry of Oil, Article (2012-2020) World Bank 3- Column III Statistical Review of World Energy, 2021, 2020, 2019, 2018.

According to available data, most of these emissions come from the South Oil Company, which is ranked first among the companies that work in Iraq as part of the licensing rounds. The Ministry of Oil is currently considering the possibility of investing in Iraq's natural gas. The amount of gas burned reached about 11 billion cubic meters, which is equivalent to about 38% of the total amount of gas burned in Iraq, followed by the Maysan Oil Company with 1.761 billion cubic meters. The Central Refinery Company ranks first in the burning of natural gas among Iraqi refineries, reaching 2.146 billion cubic meters in 2015, and the North Gas Company is the most burned among Iraqi gas companies, with a volume of 5.137 billion cubic meters in 2015 (Jaafar, 2018: 87).

Second requirement: Analysis of associated gas and water waste in Iraq due to oil extraction

First: Analysis of the impact of gas waste associated with oil extraction:

Iraq's possession of a vast wealth of gas associated with the production of crude oil and its proven and potential reserves of natural gas is the tenth largest natural gas-rich country in the world, i.e. after Russia, Iran, Qatar, Saudi Arabia, the

United Arab Emirates, Nigeria, Venezuela and Algeria. Iraq's possession of these reserves is the 57th most important in terms of international production. With Iraq's possession of these reserves, the volume of production and marketing capacity may be commensurate with the size of its international gas reserves, if this resource is used efficiently and optimally. However, the production of marketed gas is not commensurate with the total natural gas production and does not correspond to Iraq's large reserves, as a result of the country's depressed oil industry, as well as its low oil consumption. Convert natural gas into gas products that enhance the added value of this industry and the momentum of other industries and sectors (Maadhidi, 2019: 92). Although the gas accompanying oil represents 70% of the natural gas in Iraq, which comes as a natural product for extracting oil, and its investment is distinguished by its low cost, as it does not require exploration, drilling, and extraction operations, as it comes with extracted oil and requires only piping and marketing, it is lost by burning. According to Shell's estimation, the loss Iraq incurs as a result of the burning of the accompanying gas is estimated at 60 dollars per second, or the equivalent of 5184,000 dollars a day (Al-Maamouri and others, 2011: 306). The rate of gas burning is directly affected by the circumstances of oil production and in a direct relationship that means that more than half of the quantity of gas in Iraq goes to waste, because foreign companies looking for profit through increasing oil production waste billions of dollars on the Iraqi economy, especially with the absence of laws in force on those companies that force them to maintain the accompanying gas and reduce the rate of its burning. The result is the continued waste of these resources through burning it. The process of burning gas results in a loss of about 8 million dollars a day, that is, about 28 billion dollars a year, while there are countries that import this resource, paying billions of dollars, because they feel it is extremely important as a scarce resource and an important source of power generation. For example, in 2011.1 million tons of gas was imported from the United Arab Emirates, and 2.4 million tons from Kuwait (Muhammad, 2014: 133-134).

Table 2
Quantities of gas burned and projected revenue (2004-2020)

year	The expected revenue of flared gas (billion dollars) (5)	Natural Gas Price* (dollars) 4	Price of a barrel of oil (dollars)(3)	burnt gas million m3(2)	Annual oil production, million barrels (1)
2004	37642.78	5.41	31.38	6958.0	730294
2005	52028.57	7.87	45.66	6611.0	676423
2006	63464.36	9.43	54.20	6794.9	713594
2007	81012.36	11.44	66.36	7081.5	742890
2008	109773.56	15.16	87.93	7241.0	834677
2009	75581.44	10.24	59.40	7381.0	852700
2010	98751.92	13.04	75.65	7573.0	860700
2011	174073.32	18.11	105.05	9612.0	934000
2012	231315.12	18.28	106.01	12654.0	1054600
2013	234175.76	17.63	102.26	13282.0	1088000
2014	221255.79	15.79	91.63	14012.0	1180844

2015	125007.62	7.71	44.73	17374.0	1367298
2016	110286.19	6.22	36.09	17730.0	1701093
2017	151665.50	8.50	49.31	17843.0	1631185
2018	201557.77	11.31	65.60	17821.0	1610000
2019	188462.64	10.52	61.06	17914.0	1674836
2020	148204.48	8.53	49.50	17374.0	1639459

Source from Finder Setup based on 1- Column (1) and (3): Ministry of Oil, odd years. 2- Column (2): The period from 2004 to 2011 for the Ministry of Oil is years apart, and the period from 2012 to 2020 for the Global Gas Flaring Reduction Partnership, July 2020 ,3- Column (4) of the Researcher's Column (3) divided by (5.8) thermal units., Column (5) of the Searcher's column (2 and 4). * The extraction of the price of liquefied gas globally by dividing the price of a barrel of oil by the unit temperature of 5.8) the price of this liquefied gas is often closely related to the international price of oil. For example, each barrel of oil contains about 5.8 million units of heat. If the price of a barrel is \$100, the price of a million units of heat of oil is about \$17. These are the international rates of liquefied gas (source: The Arab Oil and Natural Gas Site page 22).

Considering table 2 above, it is clear that there are significant material losses associated with the waste of this resource during the period 2004-2020 and that it is increasing steadily with the increase in oil extraction, with annual oil production (730,294 million barrels) in 2004 accompanied by the accompanying waste of gas(6958.0 million m3), and while the value of the gas burned was 37642.78 billion dollars, this increase continued with the rise in oil production, especially with the contracts of the licensing rounds. The increase continued until, in 2020, the annual oil production rate was 1639459 million barrels, which was offset by the gas burning rate at 17374.0 million m3, and the material value was 148204.48 billion dollars. The material losses of burning the gas for the length of study period amounted to 2304.59 billion dollars, and the costs of building schools and raising the building capacity of this base were covered hospitals, bridges, roads, etc., and the impact this has on the employment of a large proportion of the unemployed as well as being a right of subsequent generations. Another financial loss is that the burning of 1.5 billion feet³ a day of associated gas means the loss of 1200 million feet³ a day of dry gas, which has the capacity to generate 600 megawatts of electricity a day. The same quantity also generates the loss of 7500 tons of liquid gas, which gives approximately 600 thousand cylinders of gas (cooking). This is in addition to the loss of 1650 tons of natural gas. In addition to direct financial losses, there is a loss of alternative opportunities if gas is invested in the construction of petrochemical industries, fertilizers, iron and steel, cement factories, and electricity plants, for which Iraq was founded since the 1970s. This is in addition to the high value added, large profits, and local needs, which ultimately lead to an increase in financial revenues for the Iraqi budget. "The bottom line is that there is a direct relationship between the production of oil and gas and the amount of gas burned in waste, which entails a loss of the material value of this burned gas on the one hand, as well as a loss of the alternative opportunity of losing the possible return on investment from the gas burnt."

Second: waste water used to extract oil in Iraq

The most widespread way to extract oil is by using large quantities of fresh water. Oil production processes in Iraq are under the weight of a water cycle that is financially and environmentally costly. The oil sector relies on injecting fresh water to extract oil, a technique that requires pumping of very large quantities of oil. Some oil wells in Iraq have an additional 3-5 barrels of water for each barrel extracted. This has special risks, especially after the increased extraction of crude oil in Iraq will be at the expense of water consumption. Therefore, the necessary means should be found to retrieve and reuse the water used and the water associated with crude oil (Abd Ridha, 2016:51). Injecting operations, shale production and production of shale oil require a very large amount of 5 to produce electricity, and a very large amount of oil between 5 and 500 barrels of oil a barrel of water per barrel of oil produced is equal to 159 liters per barrel. Given that there is a continuous increase in the volume of oil production, pumping needs to be increased to raise the pressure levels in the oil reservoirs and to avoid a decrease in pressure when trying to produce additional quantities of oil extracted. Therefore, the quantities of water injected in the wells are continuously doubled to maintain the required production levels. The water-propulsion system is considered the most productive system for increasing the pressure in the reservoirs, which compensates for the idleness of pressure in some areas the result of the efficient displacement of oil by means of advanced water, the amount of moving water is equal to the amount of liquid produced. Iraq is the second largest producer of the Organization of Petroleum Exporting Countries (OPEC), and it pumps most of its daily production from the oil fields in the south of the country. Basra occupies a large proportion of Iraq's oil production and contributes 94% to the total Iraqi oil exports. Basra is currently witnessing a major problem, represented by the disastrous water consumption of foreign oil companies and the extractive and refining industries in Basra. Oil companies are consuming the rivers of Basra through the quantities consumed in the oil industry in Basra, which are from the Euphrates River, the Shatt Al-Arab waters and the Al-Salal River (a branch of the Karma Ali River). In this regard, we point to the increase in injection of water in the Rumaila River, which is the largest oil-producing field in Iraq. This figure represents 14.5% of the total water share of the governorate of Basra from the Tigris River. This figure concerns one oil field, which is not static and increases with the expected volume of production. In this regard, the official website for the purpose of operating the site indicated an expansion capacity of 218 million barrels per day for the purpose of using 181.3 million barrels per day. When accounting for all oilfields in Basra province, the production rate for November 2018 was 3,254,689 million barrels per day of oilfields. The water consumption rate was used to produce one barrel of oil of 3-5 barrels of water, for the total annual water consumption of the oil industry in Basra (755,543,377 cubic meters per year), which represents 66% of the total water revenue in Basra province (the official website of the Ministry of Oil,)2018

Table 3
Quantities of water consumed for oil extraction in Iraq for the period 2004-2020

The amount of wasted water Million/L (4)	Water Barrel Capacity (3)	Amount of water used to extract oil million/barrel(2)	Annual oil production quantity Million / Barrel (1)	Year
464466984	159	2921176	730294	2004
430205028	159	2705692	676423	2005
453845784	159	2854376	713594	2006
472478040	159	2971560	742890	2007
530854572	159	3338708	834677	2008
542317200	159	3410800	852700	2009
547405200	159	3442800	860700	2010
594024000	159	3736000	934000	2011
670725600	159	4218400	1054600	2012
691968000	159	4352000	1088000	2013
751016784	159	4723376	1180844	2014
869601528	159	5469192	1367298	2015
1081895148	159	6804372	1701093	2016
1037433660	159	6524740	1631185	2017
1023960000	159	6440000	1610000	2018
1065195696	159	6699344	1674836	2019
1042695924	159	6557836	1639459	2020

Source: Prepared by the researcher based on: 1-column (1) and (3) Ministry of Oil, odd years.2- Column (2) According to the official website of the Ministry of Oil, each barrel of oil used (3 to 5) barrels of freshwater, depending on the calculation medium, an average of 4 barrels of freshwater was taken to extract a barrel of oil. By multiplying it by the amount of annual production, the amount of water used per year was extracted. In addition, the International Energy Agency announced (the adoption of the water consumption rate for the production of one barrel of oil of 3 to 5 barrels of water, which is the amount consumed in the oil fields in the Arabian Peninsula States). 3- Column (4) of the Searcher's numbers by column (2) and (3).

Given the third schedule, there is a direct relationship between increased production and increased water waste in double quantity. This means that increased production is at the expense of waste of fresh water. Annual production for 2004 was 730,294 and consumption of fresh water was 292,176 million barrels. The increase continued during the study period, reaching 163,9459 million barrels of oil and 655,7836 million barrels of water.

Third requirement: Analysis of the economic and political effects of the Dutch disease due to the extraction of oil in Iraq.

1: economic aspect: economic structure imbalance.

Production structure in the Iraqi economy impaired

The Iraqi economy has been characterized by a structural imbalance in the composition of the gross domestic product (GDP) due to the primary and primary dependence on crude oil to finance its resources, which has caused the contribution of extractive industries to the generation of GDP to increase at the expense of the declining productivity of the main sectors of the economy, such as agriculture, manufacturing, tourism and others. This has been reflected in the lack of economic balance, as the proportion of these productive sectors contributing to GDP has continued to decline and the government has not supported GDP in order to compete with imported products. These imbalances are clearly reflected in the economic activities contributing to GDP (Ministry of Planning, 2019:9). The production structure in Iraq has undergone changes over the decades. These changes are the result of the conditions experienced by the Iraqi economy, which have directly affected the structure of Iraqi production. During the period of the embargo, Iraq relied heavily on the oil-for-food program, which was introduced in 1996, and contributed to a partial alleviation of the suffering of Iraqi citizens. The program has continued for six cycles of six months each, allowing Iraq to sell part of its oil for the purchase of foodstuffs, medical supplies and materials that can be used for the partial reconstruction of services. Thus it is possible to know the extent of the contribution of economic sectors to the composition of the gross domestic product, so as to give a clear picture of the imbalance in the production structure in Iraq after one year 2003 as a result of the dependence on oil revenues resulting from the extraction of oil in the extractive sector (Azerjawi, 2019: 58). The extractive sector's contribution to GDP is high and low during the study period (2004-2020). This percentage is unstable as a result of the rise and fall in world oil prices. In 2004-2005, it reached 57.68%-57.54%. In 2009, this percentage declined to 42.97% because of the global financial crisis. Then, it rose again in 2012-2013 to 49.8%-46% as a result of the increase in oil prices, followed by the increase in oil revenues, and the increase in oil prices 2016 to 33.43% - 34.11% respectively as a result of the fall in global oil prices, and in 2020 to 30.34% as a result of the decline in oil demand and the fall in oil prices due to the coronavirus pandemic. As for the industrial sector, there has not been any clear change in its contribution to GDP. The percentage of the industrial sector's contribution to GDP in Table 4 for the period 2004 to 2020 (1.75%-2.98%) indicates the weakness of this sector, its decline and its inability to provide supplies and meet local needs. Although there are many public sector and private sector companies, they are still far from their leading role in the economic process and their contribution to GDP. This is what drives the trend towards the extractive sector and leaves the industrial sector without any interest, concentration and activation of its real role in raising productivity efficiency. As for the agricultural sector, there have been no significant developments in its contribution to GDP during the study period (2004-2020). Its contribution ranged from 6.90% to 5.82%, as shown in table 4. This shows the extent of the neglect of the agricultural sector, its lack of development and its total reliance on imports from abroad, rather than on the development of this sector. The services and distribution sector was also affected by changes in Iraq's market economy and the large production of goods and services, both domestic and foreign. These include electricity and water, construction, transportation and storage, wholesale and retail trade, hotels, finance, insurance and real estate

services, social and personal development services. The proportion of this sector's contribution to GDP reached 33.67% in 2004, which is low due to the dominance of the oil sector. This percentage is distributed among the service and distribution sectors, such as electricity and water, by 0.82%, construction (1.28%), transportation and storage, and insurance services, by 8.8%, and by a percentage of 8.7%, in the proportion of real estate and hotel services (6.90%), social and personal development services (10.32%), and the contribution of this sector continued to rise markedly, until in 2020 it became a percentage (60.86%), which is the highest rate reached by the service sector and is distributed as follows (electricity and water at 3.86%, construction and construction at 3.40%, transport, communications and storage at 9.77%, wholesale, singular and hotel trade at 9.52%), finance, insurance and real estate services at 9.29%, social development services. This increase is due to the drop in world oil prices and the drop in demand resulting from the coronavirus pandemic, and the increase in the percentage of health services contribution, thus reducing the contribution of the extractive sector to the service and distribution sector.

Table 4
Relative importance of key sectors in Iraq's GDP for the period 2004-2020

Year	Service and distribution sector %ratio to GDP	Agriculture sector ratio to % GDP	Ratio of the manufacturing % sector to GDP	Extraction sector %ratio to GDP
2004	33.67	6.90	1.75	57.68
2005	34.30	6.85	1.31	57.54
2006	40.46	5.80	1.53	55.21
2007	40.53	4.91	1.62	52.94
2008	39.28	3.81	1.67	55.24
2009	49.25	5.19	2.59	42.97
2010	47.51	5.13	2.25	45.11
2011	39.59	4.54	2.81	53.06
2012	43.40	4.10	2.70	49.80
2013	46.90	4.80	2.30	46.00
2014	49.31	4.91	1.87	43.91
2015	60.25	4.16	2.16	33.43
2016	59.72	3.94	2.23	34.11
2017	55.27	2.94	2.14	39.65
2018	50.88	2.78	2.01	44.33
2019	53.41	3.70	2.10	40.79
2020	60.86	5.82	2.98	30.34

Source: The ratios of the sectoral contribution to GDP were calculated by the researcher based on the data of the Ministry of Planning, the Central Statistical Organization, the National Accounts Directorate for various years.

Hence the need to generate growth in the non-oil sector in order to make the economy stronger and stronger in the face of external shocks, reduce dependence on a single source of income, seek alternatives to finance development projects through reconsideration of the distribution of investment allocations to the

economic sectors and the executive measures taken towards strengthening the role of the main productive and labor-working sectors in a way that ensures stimulating growth in all economic sectors without limiting it to a specific sector or activity. The nature of the agricultural production structure has affected the operational structure and the size and quality of the jobs generated by economic growth, as the oil sector, which does not exceed 56% of the gross domestic product, uses less than 2% of the total labor force, while 98% of the labor force works in low-productivity sectors, with no contribution of more than 30% of the gross domestic product.

The imbalance in the structure of exports in the Iraqi economy

Exports are an important indicator for measuring the volume or level of a country's foreign trade. The higher the percentage of exports, the better their impact on the trade balance and vice versa, the main features of exports in the Iraqi economy are that they are single exports that depend mainly on one side, namely the extractive sector (oil) and the lack of diversification of their exports to other sectors, which has negatively affected Iraqi exports. This has led to the imbalance in the export structure in the Iraqi economy (Azerjawi: 2019:62), which has led to the neglect of other sectors and has led to their vulnerability in terms of competitiveness, the quality of their production, and their inability to compete with external products in other markets. This is an inevitable result of the Iraqi rentier economy, which is characterized by a weak flexibility of the productive apparatus, and its inadequacy to meet the needs of domestic demand. Consequently, the export structure suffers from an imbalance, which is represented by the presence of a commodity that occupies a very large proportion of total exports. In other words, the exported goods are of low relative importance compared to the main commodity that is most important in exports. This reinforces the statement that the Iraqi economy is witnessing unquestionably the effects and consequences of the Dutch disease. The imbalance in the export structure can be solved through the data (table 5), which shows the relative importance of the exports of the oil exports for 2004; the percentage was 99.40%, which is very large. This shows that oil exports: account for the highest percentage of total exports, as they maintained 99% of total exports throughout the study period that is, until 2020, and 99.67%. This large-scale appropriation of oil exports at the expense of other exports shows beyond any doubt that Iraq exports only one commodity, namely oil. The data in the table below show that, as of 2020, commodity exports had not reached less than 1%. As shown in table 5, it is noted that:

Table 5
Iraqi export structure for 2004-2020 (\$1 million)

year	Contribution to Exports%	Value of non-oil exports	Contribution to Exports	The value of oil exports	Total exports
2004	0.60	107	99.40	17703	17810
2005	0.50	119	99.50	23578	23697
2006	0.75	230	99.25	30298	30528
2007	0.80	317	99.20	39270	39587
2008	0.80	510	99.20	63216	63726

2009	0.75	296	99.25	39131	39427
2010	0.75	388	99.25	51376	51764
2011	0.75	598	99.25	79083	79681
2012	0.75	706	99.25	93503	94209
2013	0.75	673	99.25	89095	89768
2014	0.75	630	99.25	83351	83981
2015	0.75	385	99.25	50943	51328
2016	0.75	306	99.25	40453	40759
2017	0.1	70	99.9	57489	57559
2018	0.1	101	99.9	86259	86360
2019	0.37	173	99.78	81412	81585
2020	0.34	137	99.76	46674	46811

Source: Prepared by the researcher based on the data of the Central Bank of Iraq, the quarterly publication is for different years.

Thus, the Iraqi economy remains dependent on a depleted resource, which is vulnerable to fluctuations in supply and demand in the world market and to high and falling prices as illustrated in the figure below, and the significant takeover of oil exports by other exports. It is clear that after 2003, Iraq was not able to build a production base for the purpose of diversifying sources of income and diversifying exports, despite the fact that it has a comparative advantage in its natural resources of arable land and the availability of oil raw material. Since the discovery of this material, however, the search, exploration, extraction and export operations have been limited to foreign companies because of their technical and technical capabilities. This led to neglect of other sectors, not only the agricultural and industrial sector, but also the tourism sector and the productive services sector (Al-Zubeida, 2017: 106), which has reflected the weakness of the general productive sectors and this is called the rentier economy (the Iraqi disease economy).

2-Political aspect: corruption, institutional weakness, and the marriage of power with wealth

Since the discovery of oil, the Iraqi economy has suffered from many problems, the most important of which are those related to the mismanagement of financial resources (oil revenues from oil revenues) by the governments that have dominated it and exploited its revenues to the full. Financial and administrative corruption is one of the most important challenges facing Iraq after 2003, and its repercussions have been reflected on many of the poor vital facilities and infrastructure, despite the huge budgets and the large funds that have been spent for this purpose. The focus has not been on the development of other sectors of this revenue, as the central government has, in return, enhanced its regional and international political status through the provision of grants and foreign assistance, as well as spending on the military side. If the government continues to mismanage oil revenues, Iraqi society will be divided into the few beneficiaries (the ruling minority) and the non-beneficiaries (the general population). This means increasing social disparity and poverty rates, leading to the spread of administrative weakness and economic corruption (Al-Azrajaoui, 2019: 75) The

phenomenon of political corruption in Iraq has spread remarkably because the political and administrative authorities are not subject to clear laws and open controls that enable them to exercise control over them, or because of the ignorance or fear of the citizen, or for many other reasons. If the possession of authority pushes its owners to exploit it for purposes other than those for which it was granted, and therefore they practice corruption, as well as individuals may help spread corruption, either because of ignorance or because of The lack of application of scientific standards in the selection of employees, especially leading officials, through quotas and political considerations; the failure to implement the principle of equal opportunities among citizens; the conflict of powers; the weakness of collective action; the prevalence of individualism in the management of institutions; the lack of clarity on procedures for cooperation, coordination and complementarity between governmental institutions in order to undermine corruption and overlook the punishment of high-ranking officials accused of corruption or mismanagement and abuse of office, which led to the collapse of the system of moral values; and the disregard by members of society of the laws in force in various fields of life and organization.

The Administrative and Financial Corruption Index (CPI) was selected to measure the waste of financial resources in the Iraqi economy because of its effectiveness in clarifying the serious economic and social consequences of the waste of resources, the increase in poverty, unemployment and the violation of the rights of generations (Al- Haidari, 2009: 12).

The phenomenon of corruption has deepened and moved from a behavioral phenomenon linked to specific groups to an integrated and interrelated institutional structure that has taken root to serve specific interests. Corruption has turned into a source of depletion and waste of public money and its extraction of an important part of income and output from the economic system. In order to explain how oil revenues and their increase negatively affect the Iraqi economy, through the increase of corruption and its spread throughout the country, as well as administrative failure. Thus, the natural resource of oil became a curse rather than a blessing. This can be illustrated by comparing the evolution of oil revenues with the corruption index (CPI) for the period 2004-2020 shown in table 6:

Table (6)
Oil revenues and CPI in Iraq for 2004-2020

year	oil revenue (Million dinars)	Index (CPI) Iraq sequencing from the total number of) (countries included in the classification
2004	32593011	130-145
2005	39448514	141-158
2006	46873201	160-163
2007	51949251	178-179
2008	76297027	178-180
2009	50190202	176-180
2010	63594168	175-178
2011	103061762.6	175-182

year	oil revenue (Million dinars)	Index (CPI) Iraq sequencing from the total number of) (countries included in the classification
2012	111326166.4	169-174
2013	105695824.7	171-175
2014	98511504.0	170-175
2015	57654597.5	161-168
2016	44806121.4	166-176
2017	65496777.0	169-180
2018	96062935.8	168-180
2019	99490603.3	162-180
2020	54448094.7	160-179

Source: of the numbers of erasers based on: 1- Ministry of Planning, Central Statistical Organization, National Accounts Directorate, National Income, various pages. 2. Official website of Transparency International, electronic document available at [http:// www.transparency.org/resech/cpi/cpi](http://www.transparency.org/resech/cpi/cpi)

It should be noted from Table 6 that the corruption index (CPI) reached its maximum level in 2007, during the period of high oil prices, as Iraq became in the last series almost (178) out of 179 countries, and remained among the last ten countries, as long as oil revenues are high. The Iraqi sequence decreased in recent years from 161 in 2015, with oil revenues falling to \$45.852 million. This indicates the correlation between oil revenues and corruption according to the corruption index (CPI). These revenues are supposed to be used to develop the Iraqi economy quickly. On the contrary, the increase in oil revenues has been accompanied by negative effects, the most important of which is the phenomenon of financial and administrative corruption, and this reflects the existence of a direct relationship between oil revenues and the aforementioned corruption index.

Fourth requirement: Analysis of the waste of the rights of subsequent generations of oil extraction

The rights of succeeding generations cover a wide area. The rights include many aspects, including economic, political, environmental, cultural and religious rights. Thus, we will focus on the waste of the rights of succeeding generations on the depleted resource (oil) in Iraq. Iraq is greatly depleted of its oil wealth in terms of increasing its production capacity and increasing its discoveries of oil fields, without objective plans that take into account the rights of future generations to this important and depleted resource. Oil production (1995) amounted to 414 million barrels per day in 2004. This increase in production has not been accompanied by any efficient utilization of oil revenues in terms of establishing investment projects that would increase the economic, social and political benefits, which have led to the only way to the increase in economic and political costs. The destruction of this resource and the guarantee of the rights of future generations is the optimal investment of revenues and their transformation into capital (physical or natural). In addition, oil is subject to the oil licensing contracts concluded by the government with foreign companies, and the accompanying large financial corruption and waste of public money resulting from inflated oil extraction costs. All of this reflects negatively on the rights of

subsequent generations. The preservation of oil in the ground and its future exploitation involves delaying production for future times. This type of delay is one of the ways to achieve the physical conservation of the oil resources, which is not reflected in the policy adopted in Iraq. We note this through the quantities of oil produced, which continue to increase without taking into account the rights of subsequent generations. As for the method of financial conservation of this resource, it requires a realistic position to ensure that the rights of the generations are genuinely created through the establishment of non-existent investment funds a large percentage of public expenditure in Iraq. Through table 7 below, and considering the Iraqi Government's budget for the period 2004-2020, which consists of revenues in the oil and non-oil sectors and expenditures in both operational and investment levels, we have found a clear violation of the rights of generations from the oil supplier and my agencies:

Table 7
Iraqi government budget for 2004-2020)(trillion Iraqi dinars)

year	expenses %investment	Operating %Expenses	non-oil % revenue	%oil revenue	total overhead	Total public revenue
2004	12.5	87.5	1.2	98.8	31521427	32988850.0
2005	12.2	87.8	2.4	97.6	30831124	40435740.0
2006	14.1	85.9	4.4	95.6	37494608	49055545.0
2007	17.8	83.2	5.5	94.5	39307836	54964850.0
2008	22.3	77.7	5.4	94.6	67277181	80641041.0
2009	31.3	68.7	9.1	94.6	67277181	55243526.0
2010	1.9	98.1	9.4	90.9	55589062	70178223.0
2011	22.7	77.3	0.9	99.1	78757666	103989089.0
2012	27.9	72.1	7.1	92.9	105139578	119817224.0
2013	33.9	66.1	7.2	92.8	119127556	113840076.0
2014	38.8	61.2	6.7	93.3	125321074	105553850.0
2015	34.7	65.3	20.1	80.9	84693524	72546344.6
2016	25.1	74.9	16.1	83.9	73571002	53413445.5
2017	21.9	78.1	15.2	84.8	75490115	77281376.6
2018	17.1	82.9	9.8	90.2	80873189	106467376.9
2019	21.8	78.1	7.4	92.6	111723523	107483586.0
2020	4.3	95.7	13.8	86.2	76082443	63199689.7

Source prepared by the researcher based on: Iraqi Ministry of Finance data, Budget Department, different years for the period 2004-2020.

As can be seen from Table (7), oil revenues are the main component of total revenues, reaching 98.8% in 2004 and 86.2% in 2020. During the study period, they remained the largest percentage of public revenues, while other non-oil revenues (taxes and fees) are....etc.), representing 1.2% (almost of the total revenue in 2004, 13.8%) in 2020, on the income side, on the expenditure side (which is important in other words how oil revenues are managed as the main component of revenue), more than 78% of the budget is spent on operational purposes (salaries and wages ...Less than 22% of these funds are channeled to investment during the study period. What is worse, 15% of these expenditures are

allocated to the oil sector, and the rest is spent to develop the remaining sectors (health, education, agriculture, industry, transportation...). In 2004, the proportion of operating expenses was 87.5 per cent, while the proportion of investment expenditures was 12.5 per cent. The percentage remained the lowest during the study period despite fluctuations. In 2020, the proportion of investment expenditures was 4.3 per cent, while the proportion of operating expenses (95.7 per cent) was from total public expenditures. This percentage shows the extent of the problem in the misuse of public revenues in general and oil revenues in particular. Through this, most public revenues, which are mostly oil revenues, are directed towards consumer expenditures. Operational expenses are also very important in the composition of public expenditures during the study period, as it is clear that the average public expenditure (95.7 per cent) for total public expenditure (only 26 per cent), with the same duration The Iraqi government's budget, which is made up of both oil and non-oil revenues and operational and investment expenditures, shows that the rights of generations from the oil supplier have been violated. With all these allocations, Iraq today does not have a good infrastructure that can be left to future generations. Moreover, the government's investment consists in rebuilding old projects or constructing new projects that take directly from oil revenues, not from revenues, as is supposed to be the case.

Fifth requirement: Proposed Strategies and Reforms to Improve the Iraqi Economy

1. Work on developing the natural gas sector Iraq has ranked 11th in the world with the largest gas reserves in the world at 132.22 trillion cubic feet. Natural gas has become a more important source of fossil energy because it is a fundamental pillar for achieving sustainable development in its economic, social, and environmental dimensions, as it is relatively clean and environmentally unpolluted energy, and is linked to about three-quarters of natural gas reserves Iraq has oil, most of which is located in the giant fields in the south. This means that 70% of the gas is associated with extracting oil. Since Iraq is the second most affected country in the world by burning the accompanying gas, we must work on exploiting it instead of wasting it Sector development to diversify
2. The production structure: There are many sectors that can be supportive of the oil sector in achieving revenues after their development and optimal utilization. Oil revenues have been managed in an efficient and optimal manner as a major advantage for the Iraqi economy. This makes the development of other economic sectors, being a comparative advantage, fully suited to uplifting the low level of income they suffer from by outlining the strategy for developing these sectors (agriculture, industry, tourism, minerals, trade).
3. Establishment of an independent sovereign fund: After achieving the required development, diversifying the structure of public revenues, achieving economic diversification by attracting foreign investments and activating the role of the private sector, attention is directed towards establishing a sovereign fund by benefiting from the experience of the international community in this field. The process of financing the fund through surplus oil revenues begins in the first phase of the establishment

of the fund. Consequently, the fund becomes funded by a specified percentage of total oil revenues. This percentage increases with the government's ability to obtain other revenues, other than oil revenues, in financing its expenditures until the government is able to dispense with the oil sector revenues.

Conclusions

1. Oil extraction generates negative side effects on the Iraqi leading to the failure to achieve the goals of, economy the dependence of the Iraqi .sustainable development economy on the process of producing crude oil as a primary's administration 'source of financial resources for the country clearly indicates that Iraq has been affected by the negative side effects of this process and the emergence of the rentier sided economy-state.
2. The increase in the oil extraction industry in Iraq is accompanied by environmental pollution, which has a negative impact on the Iraqi environment through the pollution of air, water, and soil. This is due to the backwardness of production methods and the lack of special measuring devices to calculate pollution.
3. However, the significant increase in crude oil production in Iraq has led to an increase in the quantities of gas burned in the flame, because the process of separating gas from crude oil and treating it for use as gas products such as dry gas and liquid gas requires special technologies and facilities that are not available in Iraq.
4. Oil extraction is accompanied by a waste of natural resources, without any strategic plans that are able to promote and preserve them as resources (associated gas and water used in production).
5. The Iraqi economy suffers from structural imbalances resulting from the inefficiency of the political and economic system in directing natural and human resources towards goals that would increase social and economic benefits dynamically and sustainably. The reason for this is the dependence of the Iraqi economy on a depleted resource, which is the extraction of oil.
6. The structure of exports and imports has been impaired. Oil exports represent the largest part, and have reached more than 90% of the total domestic exports, as opposed to a wide variety of imports of goods and services. This indicates the weakness of the production base and the unilateral trend of oil exports.
7. The increase in the exploitation of depleted resources and the lack of a sound strategy to exploit its financial revenues have increased the spread of corruption and administrative failure in Iraq. This has proved the existence of a direct link between oil revenues and indicators of corruption in Iraq.
8. There is no indication that the State's national administration will guarantee the rights of succeeding generations to depleted natural resources (oil extraction). On the contrary, these generations will bear the burden and costs of mismanagement of natural resources, most notably the debt trap that hobbled the economy for years to come

Recommendations

1. It is necessary to work on exploiting depleted resources (oil extraction) in a rational, well-planned way to reduce the negative side effects associated

with extracting this resource. We emphasize the need to adopt proposed remedies that would help eliminate the monopoly and rents and waste the resources that the Iraqi economy suffers from, and thus begin the path toward sustainable development.

2. It is necessary to implement laws and effective regulation of environmental protection by taking measures to reduce the damage and risks resulting from extractive operations. This is done through the application and development of environmental legislation, the imposition of large financial fines on environmental violations committed by oil companies, and their obligation to repair environmental damage caused by their oil activities
3. Taking the necessary precautions and measures to protect land, air, water and aquifers from oil pollution by applying and developing environmental legislation, taking measures to deter sudden oil spills and monitoring and control by the competent authorities for the protection of the environment, whether individuals or institutions.
4. Reduction of CO₂ emissions through actions to reduce gas combustion and energy use and restore surplus to oil wells to facilitate increased oil extraction there is a need to activate the tools that would protect and improve the environment in Iraq.
5. The need to reconsider the optimal and efficient utilization of other natural resources and to preserve them from waste and loss through investment or participation methods another tributary that flows into national revenue, especially with regard to the gas associated with oil extraction. With regard to the waste of fresh water for oil extraction, oil companies must be obliged to install companion and exhaust water treatment plants that are commensurate with the volume of oil field extraction.
6. The need to diversify the production base to increase and diversify other sources of income and to increase the competitiveness of non-rentier sectors to mitigate the effects and dimensions of the Dutch disease. This depends on using oil revenues as a strong impetus to achieve comprehensive development, by paying attention to all economic sectors, especially the agricultural sector, and providing the necessary support.
7. The need to provide efficient management capable of improving the economic and social reality, not only in the oil sector but in all aspects, and to be distinguished by stability to lay the foundation and the main basis for the targeted development process through :
 - a) Work to provide security and political stability as the basis for attracting foreign investment to various economic sectors and the influx of foreign capital.
 - b) To take a series of measures to combat financial and administrative corruption and the waste of oil wealth by passing legislation and penalties, unifying the country's regulatory bodies, reforming the tax system and implementing judgements, and carrying out a revolution against corruption and corruptors, and to address this phenomenon, which has become a major and destructive obstacle to achieving economic reform and improving the economic situation
8. It also ensures that oil wealth is not squandered, and that real development opportunities are lost. It also denies future generations their natural right to this wealth, which current generations are currently working to exploit. It also works to establish a sovereign fund for sustainable development in

Iraq, to be financed from the cash surplus of oil revenues. It also manages the Fund's investments in achieving sustainability to preserve the rights of subsequent generations.

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