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Measuring and analyzing the impact of oil revenues on sustainable development in Iraq for the period (2003-2020)

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Abstract
The importance of oil is due to its position as a strategic raw material and its practical impact on various economic activities. It plays a vital role in determining the course and nature of sustainable development and is an essential source of income for oil-producing countries. Its importance is highlighted as an essential product in foreign trade. The oil sector also constitutes the backbone of the Iraqi economy, as is the case in other oil-producing countries, and is still the dominant sector in the Iraqi economy. This study addressed the oil revenues of Iraqi crude oil exports and the possibility of investing these revenues in sustainable development. The research aimed to shed light on the importance of oil revenues in Iraq and the possibility of investing them in building sustainable development with a positive impact on current and future generations, as they have a legitimate right to this wealth, and therefore, it must be invested well. The results of the study showed that increasing oil revenues by (1%) contributes positively to increasing the average national income per capita by (0.03%). The relationship between oil revenues and unemployment does not show statistical significance in the short or long term, and the results indicate that the probability levels exceed the traditional threshold of 5%. In addition, the results showed a strong positive relationship between oil revenues and carbon dioxide emissions, indicating that increasing oil revenues by (1%) leads to a significant increase in carbon dioxide emissions by (4%).

Keywords: Oil revenues, Sustainable development

Introduction
Oil is a strategic commodity that plays a vital role in determining the path of development in both oil-producing and oil-exporting countries, as it represents an essential raw material in the industry and has a practical impact on various aspects of the country's economic, financial and banking activity. Iraq, like other developing oil-producing countries, depends mainly on this resource, and Iraq's extraordinary wealth has become a curse over time. The increasing dependence of the Iraqi economy on this resource made it suffer from continuous crises and significant problems, especially with the decline in crude oil prices globally. The link between the Iraqi economy and the primary variable represented by conventional energy is a factor in the absence of sustainable development requirements as a result of the instability of the market and sharp fluctuations in prices, which puts the Iraqi economy at the mercy of a depletable resource and has negative repercussions that limit the achievement of the requirements of sustainable development. It is also the primary source of financing the development process and plays a fundamental role in determining the course and nature of development. The oil sector is the backbone of the economy in Iraq, as is the case in other developing countries, because it remains the dominant economic sector.

Search problem
The research problem revolves around the high percentage of oil export revenues from total revenues, which makes the Iraqi economy more vulnerable to external shocks represented by oil price fluctuations. Despite the essential role played by the oil sector in the Iraqi economy, oil export revenues have not been well exploited to activate sustainable development.

Research hypothesis

The research is based on the hypothesis that rational and prudent investment in oil export revenues will positively impact sustainable development indicators.

Research Objective

The research aims to shed light on the importance of oil revenues in Iraq and the possibility of investing them in building sustainable development that will positively reflect on current and future generations of society. They have a legitimate right to this wealth, so it must be invested in a good and sustainable manner.

- **Time limits:** The study was determined from the year (2003-2020)
- **Spatial boundaries:** The research focused on studying the impact of oil revenues on sustainable development in Iraq.
- **Research Methodology**
  The research relied on the descriptive analytical approach in analyzing data taken from international organizations, tables of oil export revenues, and some indicators of sustainable development in Iraq, as well as the quantitative method to measure the relationship between them.

The first topic

Theoretical Framework for Sustainable Development and Oil Export Revenues

First: The theoretical framework for sustainable development

Sustainable development is an approach, a way of life and a philosophy based on comprehensive and integrated thinking through the use of comprehensive and sub-systems and the relationships that link them and the results and feedback processes that result from them in dealing with the problems of societies. The application of the sustainable development approach requires that local official bodies develop integrated management methods through which society is dealt with as an integrated system that includes a group of systems such as the economic, social and natural systems that affect and are affected by each other on a permanent and continuous basis. Therefore, the dynamism of these systems requires continuous control and guidance processes to reduce the negatives and maximize the positives. This is the role of sustainable development, which depends greatly and directly on the participation of the population in all its activities and its various stages. Sustainable development deals with environmental conservation procedures and the process of economic growth as integrated and not contradictory processes(Habib & Hanan, 2014, p. 195).

1. **The concept of sustainable development:** Before talking about sustainable development, we must distinguish between economic growth, economic development, and sustainable development, and the most important differences between them are economic growth and development, which refer to change for the better. A number of economists use GDP or real national income to determine real GNI per capita as an indicator of economic growth. This means an increase in GDP greater than population growth, which means that the growth rate must exceed the rate of Population growth. (Ajamiya *et al*., 2008, 77), Moreover, economic growth is understood as natural and spontaneous progress without individual or societal intervention. At the same time, development is a deliberate process based on the mobilization of materials according to plans and programs for rapid growth over a specific period in order to bring about structural changes that lead to the economic and social development of society through the use of the public and private sectors and its goal and means are the development of the individual and society. (Kafi, 2013, 52).

As for economic development, it is represented in increasing production and organizing work through radical structural, economic and social changes that address the improvement of social production conditions and contribute to meeting the needs of the individual and society through the mobilization of primary resources and the use of labour resources in the production process through the employment of qualified, productive labour to develop the production process and achieve balanced growth in various sectors and economic activities. (Quraishi,2017.48).

The concept of sustainable development is relatively modern in relation to the environmental framework in various countries. Recently, interest in environmental issues has focused on reducing environmental pollution of various types. The concept of economic development has changed after introducing the environmental dimension into the field of economics from the process of increasing the exploitation of scarce economic resources in order to satisfy multiple and diverse human needs and another concept concerned with the necessity of preserving natural resources and the environment and reducing pollution. Therefore, the concept of sustainable development emerged, and this concept includes two main dimensions: development, a process of changing the economic, social and cultural structure of society, and sustainability, as a temporal dimension that means the sustainability of something. (Somaya, 2014, 47) The motivation behind this concept is the recognition that the growth process in itself is not sufficient to improve the standard of living of individuals because it is characterized by a fair distribution of development in an equitable manner, in addition to the fact that the focus on the material dimension of the growth process has declined and has been replaced by attention to the human element, which is the goal and tool of the development process at the same time. However, a genuine interest in sustainable development arose in the early seventies of the twentieth century through studies that dealt with the problem of human mistreatment of the environment and also focused on environmental constraints and the link between concern for the environment and development. Many definitions by Barber have defined sustainable development as the activity that leads to the promotion of social welfare with the most incredible attention to the available natural resources and with the least possible damage and abuse of the environment. and explains that sustainable development differs from development because it is more complex and intersecting with natural and social development, (Osmani, 2013, 6) while the World Commission for Environment and Sustainable Development defined it as development that meets the needs of the current generation without harming the ability of future

generations. To meet their needs (Salehi, 2014, 5) [16].

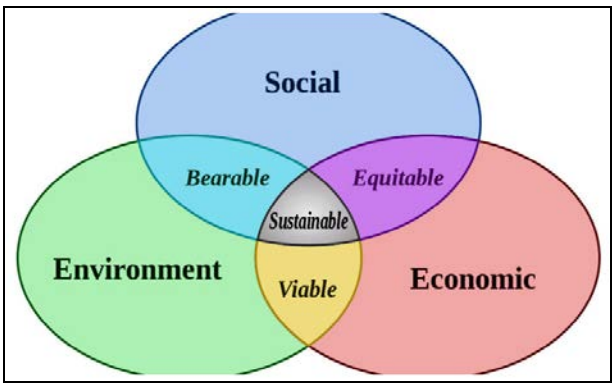
2. **Characteristics of sustainable development** Sustainable development is characterized as a renewed kinetic process that moves from one level to another, and this is the feature of sustainability. Moreover, its most important characteristics can be clarified as follows (Al-Azzawi, 2016, 57) [4]:

- The concept of development is not limited to increasing national income but includes progress in all other areas, such as education, health services, income balance and the environment.
- Sustainable development is based on meeting the demands of the poorest segments of society and seeking to reduce the exacerbation of poverty worldwide.
- Sustainable development is based on the idea of justice between individuals, between generations and between peoples, as well as attention to the role of civil society and its organizations.
- Sustainable development depends primarily on its constituents within the geographical space, especially on man and the environment. It is characterized by the individuality and continuity of the needs of the present generation without harming the next generation in meeting its own needs.

3. Dimensions of sustainable development

There are different theoretical approaches to interpreting sustainability, the most commonly used being the one identified by the Earth Summit or Johannesburg. This approach states that sustainable development is based on three basic dimensions: (Salehi, 2015, 6) [16].

4. **Economic dimension:** Economic development is to improve the standard of living of individuals by providing goods and services to meet various human needs and achieve well-being continuously without harming the natural environment, and this requires changing production and consumption patterns in order to reduce the waste of natural resources, and this dimension aims to bring about quantitative and qualitative economic and social changes in order to change the economic structure and the social and demographic system in a planned manner in order to achieve sectoral goals and increase the production of units in the economy and society at all levels, in order to improve the production process qualitatively and quantitatively for the better, all this serves the well-being of people and is the goal of development. (Al-Azzawi, 2016, 56) [4].
5. **Social dimension:** This means the equitable distribution of wealth among members of society, the provision of essential services such as health, education and housing to the poor groups in society, the elimination of economic and social disparities, gender equality, and the possibility of political participation. This dimension requires an analysis of the social environment with a focus on social structure, reconstruction rates, the educational and health system and its development, as well as social organizations, without neglecting the technical and technological aspects of employment and their impact on society, including the Unemployment and how to acquire knowledge and achieve a certain level of prosperity and decent life. The social component refers to the relationship between nature and man, the advancement of people's well-being, improving access to health services and primary education, adhering to minimum security standards and respect for human rights, development of different cultures, diversity and pluralism, effective participation of grassroots in decision-making, and contributing to social development among all segments of society (Al-Taher, 2013, p. 81) [19].
6. **The environmental dimension:** Sustainable development in this dimension imposes the need to maintain a stable base of natural resources rationally and rationally. Therefore, sustainable development does not focus on the environmental aspect only. However, as we mentioned, it includes economic and social aspects,. Therefore it is a three-dimensional development interconnected, integrated and overlapping within the framework of a precise and rational interaction of materials. The problem of environmental pollution is increasing day by day in all countries, whether in developed or developing, due to the increase in urbanization and industrialization. The trend of migration of individuals from villages to cities has been observed all over the world, as cities are centres of production, consumption and waste disposal (Abu Zant, Ghoneim, 2006, 160) [2]. The following illustrative chart of areas of sustainable development can be presented as follows:



Plan 1: Areas of Sustainable Development

Source: Rabie al-Islam, Shamhouri Suwar and Shahruddin Muhammad Ismail, (2010) [15], The Effects of Trade and Environment on Sustainable Development, American Journal of Environmental Sciences, 16.

Therefore, sustainable development in its three dimensions implies the need for fundamental changes in society, and in order for this development to be based on solid foundations, it must be based on the reality of the capital stock that supports and depends on it. Here, we do not mean capital as a factor of production, but capital, which includes all the factors and capabilities of society and reflects the components of the dimensions of this development.

Second: The theoretical aspect of oil revenues

1. The concept and importance of oil revenues

The oil sector, represented by its financial revenues, plays a vital role in all economic activities because it helps to develop and strengthen the national economy through the development and development of the rest of the economic sectors. It is an essential source of financial revenues that finance the general budget of most countries producing and

exporting crude oil (Yamani, 2000, 17) [21] and also contributes to determining national income and affects the average per capita output or national income, as well as its contribution to foreign trade through the current account, which represents oil exports. As a result, the oil sector plays a vital role in the process of economic development, increasing the purchasing power of individuals and shaping the country's economic landscape (Zubaidi, 2007, 177) [7] and oil revenues can be defined in general as the revenues, revenues or gains obtained by some countries producing and exporting crude oil in exchange for the production and export of one of the natural resources, crude oil. In return they receive cash as part of the actual value of this resource (Sarim, 2003, 31) [17].

2. Factors affecting the determination of oil revenues There are a number of factors that affect crude oil revenues, including:

A. Nominal crude oil prices: Nominal oil prices are directly related to the volume of oil revenues of countries producing or exporting crude oil, as oil price fluctuations in international markets play an important role in determining this volume (Ismail, 2004, 53).

B. Exchange rates: Since crude oil prices are determined by the US dollar in global markets and because there is an inverse relationship between the price of crude oil and the dollar exchange rate, any decline or rise in the US dollar's exchange rate has negative or positive effects on the purchasing power of oil revenues. (Janabi and Hussein, 2011, 12) [5].

C. Speculation in the purchase and sale of crude oil: Immediate and forward oil speculation in the international oil market is one of the most important causes of crude oil price fluctuations, as it depends on predicting future crude oil prices. When there is an expectation of high prices, speculators start buying crude oil and vice versa, and therefore, this mechanism greatly affects the collection of oil revenues (Abed Reda, 2011, 113) [1].

D. Crude oil production capacity: Production capacity plays a positive role in determining oil revenues. The rise in this capacity leads to a significant rise in oil revenues, and vice versa, as production capacity determines the amount of current and future oil supplies and exports (Hassan, 2007, 26) [19].

E. The size of oil reserves: The oil reserve is one of the most important factors affecting the size of oil revenues through new oil discoveries. Oil can be extracted at economical costs that correspond to current crude oil prices and modern technologies by reaching new oil layers and reservoirs at the lowest costs, leading to a rise in the volume of oil production, which is reflected in the increase in oil revenue (Sarim, 2003, 47) [17].

F. The political factor: The political factor has a significant impact on the level of oil revenues in times of crisis or when there are imbalances in the structure of the global oil market, and the political decision is no less important than other factors in affecting the level of oil revenues, for example, the decision to reduce production approved by OPEC several times had an impact on crude oil prices and oil exports of producing countries, and this affected the decline in oil revenues for some oil-producing and exporting countries.

The second topic

Analysis of the evolution of oil potential trends and some indicators of sustainable development (2003-2020)

First: Analysis of the development of oil potential trends: The oil sector plays an essential and decisive role in driving the economies of many countries, especially in Iraq, where it forms the backbone of the Iraqi economy. The oil sector remains the leading sector, contributing about two-thirds of GDP, about 92% of total revenues, and 98% of total exports. Based on these figures, it is clear that the oil sector occupies a unique and important position in the Iraqi economy. It is the only sector responsible for generating financial revenues for the state budget and thus plays a pivotal role in driving growth and sustainable development. In this research, we aim to assess Iraq's oil potential through the following:

1. **The size of Iraq's oil reserves**. The size of oil reserves is a factor affecting oil revenues. Iraq has vast oil reserves, making it a major player in the global oil market. It ranks fourth in the world in terms of proven oil reserves after Venezuela, Saudi Arabia and Iran. Many studies confirm that the proven oil reserves in Iraq exceeded (115) billion barrels in (2003) and this level remained stable until (2009); these estimates of confirmed crude oil rose to (143.1) billion barrels in (2010) to constitute (11.96%) of Opec reserves and (9.82)%) of the world's reserves, as a result of the contracts concluded by the Iraqi Ministry of Oil with foreign companies, licensing rounds, to conduct a comprehensive study of the Iraqi oil fields and expand their investment activities (Hussein, 2017, 86). It began to rise to reach the highest estimates during the study period to reach (148,766) in (2017) and then reduce the oil reserves to record estimates of (145.01) billion barrels in (2020).
2. **Production and export capacity of Iraqi oil The** increase in the size of the oil reserve leads to an increase in the production capacity and, thus, the export capacity of Iraqi crude oil. The production capacity of crude oil is one of the main factors affecting the level of oil revenues from the export of crude oil. In Table (1), it is noted that the operations of enhancing production and export intensified after (2003) due to the renewed interest and priority given by the state to this sector as the main driver of the Iraqi economy. After crude oil production reached (145) thousand barrels per day and exports of approximately (388) thousand barrels per day in (2003), production increased in (2008) to (2,280) thousand barrels per day and exports of (1,900) thousand barrels per day. Due to the attention given by the National Development Plan (2010-2014) to oil activity, crude oil production increased in (2014) to (3,110) thousand barrels per day, and oil exports increased in the same year to (2,515) thousand barrels, which coincided with the development of the infrastructure, especially the capabilities of export markets. The production and exports increased to reach (3,504) thousand barrels per day and (3,004) thousand barrels per day. Barrels per day in the year (2015) respectively and continued to rise until the year (2017) when production and exports reached (4,468) and (3,802) respectively. As for the year (2020), production and exports decreased as production reached (3,996)

thousand barrels per day while exports reached (3,428) thousand barrels per day. This problem was reflected in oil revenues from crude oil exports, which is the basis for generating oil revenues. Iraq is the main and even the only source of financing development programs in general.

Despite the high growth rates in oil sector revenues, the Iraqi economy has not yet reached the stage of take-off or self-growth due to the failure of economic policies to decouple the Iraqi economy and liberate it from the unilateral structure of dependence on oil resources. Therefore, oil revenues play an important role in the Iraqi economy, as the decline in oil production was a direct result of the decline in export volumes and, thus, the decline in revenues. Table (1) also indicates that crude oil exports were characterized by an increase during the study period with the increase in oil revenues and began to increase during the study period, as shown in table (1). Oil revenues increased from (8,627) million US dollars in 2003 to (63,000) million dollars in 2008. Through the prices of crude oil in the global markets, this improvement continued until 2012, when oil revenues reached approximately (92,685) million dollars, which is the highest value reached during the study period. After that, oil revenues began to decline as a result of the decline in oil prices in general, especially in the years (2015-2016) and the decline in the price of a barrel of oil from (109) dollars per barrel to less than (40) dollars, which caused a deficit in the Iraqi budget, forcing the Iraqi government to borrow.

Table 1: Evolution of the volume of oil indicators of Iraq for the period (2003-2020) million dollars

Years	Oil Prices OPEC Basket	Oil reserves of million barrels	Oil production of thousand barrels	Oil export of thousand barrels	Oil revenues million dollars	Oil Production Growth	Oil revenue growth	Total export revenues million dollars (*)	Percentage of oil revenues from total exports (*)
2003	28.10	115,000	145,019	388.6	8,627	ـــــ	ـــــ	9,711	77.50
2004	36.05	115,000	2,107.2	1,450.2	17,751	52.93	135.58	17,810	99.55
2005	50.64	115,000	1,853.1	1,472.3	24,058	-12.05	32.99	23,697	99.50
2006	61.08	115,001	1,957.2	1,467.8	32,242	5.62	28.50	30,529	99.25
2007	69.08	115,002	2,035.1	1,643.0	33,712	3.99	30.08	39,515	99.74
2008	94.45	115,000	2,280.4	1,900.3	63,000	12.05	55.06	63,726	95.90
2009	61.06	115,010	2,336.2	1,906.0	43,895	2.44	-35.68	39,431	99.69
2010	77.45	143,101	2,358.2	1,890.4	54,248	0.94	31.26	52,483	98.32
2011	107.46	141,351	2,652.6	2,165.7	83,768	12.49	60.91	83,226	99.74
2012	109.45	140,300	2,942.3	2,423.3	92,685	10.92	13.35	94,392	99.68
2013	105.87	144,211	2,979.6	2,390.4	90,411	1.26	-4.98	93,065	96.06
2014	96.29	143,069	3,110.6	2,515.6	81,740	4.39	-5.70	88,949	94.78
2015	49.49	142,503	3,504.2	3,004.9	43,047	12.66	-41.63	57,577	85.47
2016	40.76	148,766	4,647.8	3,803.5	28,095	32.64	-11.23	46,831	93.28
2017	52.43	147,223	4,468.7	3,802.1	46,513	-3.85	36.73	63,604	93.92
2018	69.78	145,019	4,410.1	3,862.0	72,924	-1.32	41.01	92,831	90.72
2019	64.04	145,019	4,576.0	3,968.1	78,527	3.77	-4.98	88,903	90.02
2020	41.47	145,019	3,996.5	3,428.4	41,756	-12.66	-44.66	46,811	94.61

Source: Prepared by the researcher based on the data taken from the following source:

OPEC Organization, Annual Statistical Bulletin, database

Second: Analysis of some indicators of sustainable development in Iraq

Iraq has the material and human potential that can contribute to the achievement of sustainable development goals, and this requires planning and preparing programs, plans and legal legislation and setting periods for each of the dimensions that correspond to its applicability. Due to the multiplicity of indicators that represent sustainable development, so one indicator will be mentioned for each dimension of sustainable development, as follows:

1. **Economic dimension:** Indicator (per capita gross national income) This indicator is one of the leading and essential indicators to show the level of economic well-being of society. It represents the individual's share of the annual national income, i.e. the amount of money that an individual receives during that year. It is a measure of sustainable development, although it does not measure it ultimately. However, it represents a central and essential element of the quality of life. This means that achieving a continuous increase in the national income per capita is a necessary policy to improve the level of sustainable development. (Abbas and Manar, 2020, 62) The goal of sustainable development is to provide a decent standard of living for the individual by increasing income levels because low-income levels have negative effects on the level of employment and, as a final result, lead to increased unemployment rates. Table No. (2) shows the apparent fluctuation in the gross national income, which affected the average per capita income, as the gross national income amounted to about (21,945) million dollars in the year (2003), while the average gross national income per capita amounted to (643) dollars. However, after the year (2003), the gross national income witnessed gradual growth until it reached (135,099) million dollars in the year (2008) as a result of the increase in oil revenues, which led to an increase in the salaries of state employees, and the expansion of the social insurance system due to the rise in global crude oil prices and a kind of improvement as a result of a kind of relative stability in the security situation, which in turn was reflected in the average gross national income per capita, which amounted to (3,212) dollars. However, in the year (2008), the average gross national income per capita amounted to (135,099) million dollars, while in (2009) the average per capita gross

national income was about (1,212) dollars, while (2008) average per capita gross national income was (1,212) In the year (2009) Both the gross national income and the average per capita share of the gross national income witnessed an apparent decline due to the financial crisis that occurred in (2008) which led to a decline in crude oil prices. After that, the gross national income began to rise, which in turn was also reflected in the average per capita share until (2013) when it reached (233,577) million dollars (2013) while the average per capita share was (5,546) dollars. In (2015) there was a decline in the gross national income after that, as it reached (165,257) million dollars with a growth rate of (27.38%) due to the decline in Iraqi oil revenues resulting from the export of crude oil as a result of the deterioration of the situation Security and the entry of armed groups, which affected the oil-producing fields and the burning and destruction of oil wells, which led to some of them stopping production in the year (2015), then the gross national income and the average per capita share of the gross national income witnessed a noticeable decline, as the gross national income reached (185,776) million dollars in the year (2017), while the average per capita income reached (3,867) dollars, after which the gross national income continued to rise until it reached (323,469) million dollars and the average per capita income (4,554) million dollars, with an annual growth rate of (3.01%) in the year (2019) due to the rise in crude oil prices, which in turn was reflected in the increase in oil revenues from crude oil exports, while in the year (2020), the gross national income decreased to (182,171) million dollars, while the average per capita gross national income reached (3,222) dollars, with a negative growth rate of (29.24%) as a result of the economic effects of the global Corona virus crisis (Covid-19).

2. **Social dimension:** Indicator (unemployment rate) Unemployment is a problem suffered by most developed and developing countries, although its severity varies. In Iraq, unemployment is one of the most important and serious economic and social problems facing the Iraqi economy.

   The Iraqi economy suffers from chronic unemployment, as table (2) indicates that unemployment rates peaked at about (28.1%) in (2003), the highest rate during the study period. It then declined to (11.7%) in (2007) as a result of significant transformations in the Iraqi economy, including increased openness to global markets, removing restrictions on the movement of goods and services, and moving from a planned economy to a free market system. These measures aim to correct structural imbalances, strengthen the private sector, and create a favourable environment to attract foreign direct investment, thus maximizing job opportunities and reducing unemployment rates. Unemployment rose to (15.2%) in (2010), due to the increase in oil revenues after the rise in crude oil prices, which peaked at (83) dollars per barrel in early (2010) and reached (90) dollars in early (2011). This period facilitated employment in civil government departments and security services, which absorbed the majority of the new jobs. However, by (2016), the unemployment rate had fallen to (10.8%), rising again to (14.08%) in (2020) due to lower oil prices, which subsequently led to a reduction in financial allocations for public sector appointments.

3. **Environmental dimension (Carbon dioxide emissions):** This indicator is of particular importance as it allows for achieving sustainable development goals by monitoring changes in the environment, whether positive or negative, and because the relationship between sustainable development and the environment must be coherent in order to protect the environment, ensure the continuation of sustainable development, and alleviate pressures associated with development that conflict with environmental balances. The redesign of development indicators has allowed for the inclusion of environmental issues alongside those related to development, which have been included in the framework of indicators, to be part of the development process and in a way that deepens the process of understanding the interactions between the environment and development (Maher, 2017, 20). From table (2), we note that the average per capita emissions of carbon dioxide in 2003 amounted to about (3.17) tons, then rose in 2004 to (3.35) tons. Due to the lifting of economic sanctions and the opening of the Iraqi economy to the outside world, the average per capita share decreased to the lowest share that could be achieved (2.75) tons in (2007). The decrease in emission rates in the last two years is due to unstable security conditions and the cessation of processing in local refineries, which led to a decrease in emission rates for this period. Then, there was a gradual increase to (4.20) tons in the year (2013) due to the increase in oil production as a result of the rise in crude oil prices around the world. After that, it began to decline and then reached (3.74) tons in the year (2015) and then rose again until it reached its peak at about (4.44) tons in the year (2019). As for the year (2020), the average per capita share decreased to approximately (4.02) tons.

The third topic

Measuring the impact of oil revenues on sustainable development in Iraq for the period (2003-2020)

First: Test the root of the unit.

To prove the validity of the research hypotheses and achieve the main objective of the research, as well as to support the results of the analysis presented in the first section, we will describe the essential variables. The dependent variables represent the indicators of sustainable development (Y1, Y2, Y3). The independent variable is the oil revenue index (X), as in the following table:

Table 2: Sustainable Development Indicators in Iraq for the Period (2003-2020)

Years	Total National Income (Million USD)	Average gross national income per capita	Growth rate of average gross national income per capita	Unemployment rate	CO2 emissions (average per capita metric ton)
2003	21,945	643	————	28.10	3.17
2004	36,680	1007	56.67	26.80	3.35
2005	45,427	1196	18.68	17.90	3.16
2006	61,594	1659	38.73	17.50	3.02
2007	85,770	2348	41.54	11.70	2.75
2008	135,099	3657	55.75	15.40	3.11
2009	114,753	3212	-12.17	15.20	3.25
2010	140,109	3729	16.10	15.20	3.65
2011	185,512	4615	23.77	11.10	3.68
2012	219,062	5325	15.37	11.90	4.05
2013	233,577	5546	4.17	12.10	4.20
2014	227,112	5106	-7.94	12.90	3.90
2015	165,257	3708	-27.38	13.20	3.74
2016	165,041	3622	-2.32	10.80	3.88
2017	185,776	3867	6.75	13.80	4.13
2018	225,613	4421	14.33	13.80	4.24
2019	232,469	4554	3.01	12.86	4.44
2020	182,172	3222	-29.24	14.09	4.02

Source: Prepared by the researcher based on the data taken from the following source:
1- World Bank, Open Data: https://data.albankaldawli.org

Table 3: Description of research variables

Interpreted variables (Oil Revenues)	Oil Revenues	X1
Supported variables Sustainable Development Indicators	Average per capita national income	Y1
	Unemployment	Y2
	Carbon dioxide emissions	Y3

The researcher created the table based on the model description.

The ARDL model was evaluated using annual data and Eviews 12 software. Prior to conducting the model testing, we will provide a table demonstrating the stability test of the time series for the study variables based on the outcomes of the Phillips-Perron test (P.P).

Table 4: Outcomes of the Phelps-Perron Test

Stability Test						
Variables	Level			1st Difference		
	PP	Sig.	Result	PP	Sig.	Result
X	-0.87645	0.0235	stationary	-1.765467	0.0038	stationary
Y1	-2.98765	0.0012	stationary	-2.569597	0.0054	stationary
Y2	-0.54325	0.8350	No stationary	-2.087654	0.0287	stationary
Y3	-0.184583	0.6153	No stationary	-3.345677	0.0048	stationary

Source: The table was prepared by the researcher based on the Eviews.12 program

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Second: Assessing the influence of oil revenues on the average per capita national income Y1.

1. Evaluate the ARDL self-regression model.

Performing the unit root test on the economic variables determined that they are stable at both the level and the first difference. With this criterion met, we proceeded to apply the ARDL model test, and the table below presents the findings for this model.

Table 5: ARDL Model Test Preliminary Assessment Results.

Method: ARDL			
R - Square	0.947038	Mean Dependent Variance	3575.953
Adjusted R-Square	0.939473	Standard Deviation Dependent Variance	1366.294
S.E. of regression	336.1401	Akaike Information Criterion	14.63172
Sum squared resid	1581862	Schwartz Criterion	14.77876
Log-likelihood	-121.3696	Hannan-Cohen Criterion	14.64633
F-statistic	125.1714	Durbin-Watson Statistics	1.309745
Prob(F-statistic)	0.000000		
*Note: P-values and any subsequent tests do not account for model selection.			

***Source*:** The table was prepared by the researcher based on the Eviews.12 program.

Table (3) displays the results of the Adjusted R-squared test's explanatory power, which demonstrates that the independent variable (X) accounts for (93%) of changes in the dependent variable (average per capita national income, (Y1) The results of the Durbin-Watson stat test revealed no autocorrelation, and the (F) test indicates the model's overall statistical significance.

2. Bound Test results.

To assess the degree of a long-term equilibrium connection

(Cointegration) between (X) as the independent variable and (Y1) as the dependent variable, a bound test must be performed, as shown in the following table:

Table 10: Boundary test results

Statistical Test	value	K
F-Statistician	20.96227	1
(Critical Restricted Value)		
Morale level	I0 binding	I1 Binding
5%	3.62	4.16

Source: The table was prepared by the researcher based on the Eviews.12 program.

It is noted from Table (4) above that the calculated value of (F-statistic) reached (20.96227), which is greater than the tabular value at a significant level (5%). This means that there is a joint integration relationship between (X) and (Y1), i.e. the existence of a long-term equilibrium relationship.

3. Evaluate the calculated parameters (short-term).

This test estimates short-term parameters to assess the extent of the independent variable's influence on the dependent variable. It also reveals the error correction coefficient, which quantifies the model's rate of return to long-term equilibrium, as illustrated in the table below.

Table 5: Outcomes of the Short-Term Relationship and Error Correction Model Estimation

ARDL Long Run Form and Bounds Test				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	368.5196	218.5913	1.685884	0.1140
Y1(-1)*	-0.562346	0.075631	-7.435404	0.0000
X**	0.031291	0.004729	6.616591	0.0000

Source: The table was prepared by the researcher based on the Eviews.12 program.

The table above shows the results in the short term

1- A positive correlation exists between oil revenues (X1) and average per capita national income (Y1); specifically, a (100%) rise in the oil revenues index results in a (3%) increase in average per capita national income (Y1) at a significant level of (0.0000).
2- The estimated relationship also revealed that the error correction coefficient reached a negative and significant value of (-0.56), indicating that there is a short-term equilibrium relationship between the variables (X) and (Y1) and that this relationship is heading toward a long-term equilibrium.

4. Evaluate the projected parameters (long-term).

This test estimates long-term parameters to assess the extent of the independent variable's effect on the dependent variable and to identify the nature of the long-term connection, as seen in the table below.

Table 6: Estimation Results of Long-Term Parameters

Equation of levels				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
X	0.055643	0.006290	8.846346	0.0000
C	655.3254	365.7135	1.791909	0.0948
EC = Y1 - (0.0556 * X + 655.3254)				

Source: The table was prepared by the researcher based on the Eviews.12 program.

A positive correlation exists between oil revenues (X1) and average per capita national income (Y1); specifically, a 100% rise in the oil revenue index results in a 5% increase in average per capita national income (Y1) at a probability level of (0.0000).

5. Autocorrelation problem test

Table 7: Sequence Correlation Test for LM Test

Breusch-Godfrey Serial Correlation Lagrange Multiplier Test:			
F-statistic	0.107467	Prob. F(2,65)	0.8983
Obs*R-squared	0.234000	Prob. Chi-Square(2)	0.8896

Source: Table prepared by the researcher based on the outputs of the Eviews.12 program.

The test results indicate that the estimated model is free from autocorrelation problems, as the statistical value of (F) is not statistically significant.

6. Test the problem of homogeneity of variance

Table 8: Heteroskedasticity Test: ARCH

Heterogeneity test: ARCH			
F-statistic	0.678387	Prob. F(1,68)	0.4130
Obs*R-squared	0.691441	Prob. Chi-Square(1)	0.4057

Source: Table prepared by the researcher based on the outputs of the Eviews.12 program.

The test findings indicate that the estimated model is not affected by homogeneity inequality since the statistical value of (F) is not significant.

Third: Estimating the impact of oil revenues on unemployment Y2.

1. Evaluate the ARDL self-regression model.

Upon performing the unit root test on the economic variables, stability was seen at both the level and the first difference. With this criterion met, we proceeded to apply the ARDL model test, and the table below presents the findings for this model.

Table 9: ARDL Model Test Preliminary Assessment Results.

Method: ARDL			
R-square	0.626891	Mean Dependent Variance	14.48535
Adjusted R-square	0.573590	Standard Deviation Dependent Variance	3.769332
S.E. of regression	2.461378	Akaike Information Criterion	4.798105
Sum squared resid	84.81731	Schwartz Criterion	4.945142
Log-likelihood	-37.78389	Hannan-Cohen Criterion	4.812720
F-statistic	11.76128	Durbin-Watson Statistics	2.763657
Prob(F-statistic)	0.001007		
*Note: P-values and any subsequent tests do not account for model selection.			

Source: The table was prepared by the researcher based on the Eviews.12 program.

Table (3) shows the results of the explanatory power of the Adjusted R-squared test, which shows that (57%) of the changes in the dependent variable (unemployment Y2) are caused by the independent variable (X). The (F) test indicates the significance of the model as a whole in

statistical terms, and the results of the (Durbin-Watson stat) test showed no self-correlation.

2. Bound Test results.

To test the existence of a long-term equilibrium relationship (the existence of cointegration) between (X) as an independent variable and (Y2) as a dependent variable, it is necessary to conduct a bound test, as shown in the following table:

Table 10: Boundary test results

Statistical Test	value	K
F-Statistician	4.345017	1
(Critical Restricted Value)		
Morale level	I0 binding	I1 Binding
5%	3.62	4.16

Source: The table was prepared by the researcher based on the Eviews.12 program.

The table above shows that the computed value of the (F-statistic) reached (4.345017), which is more than the tabular value at a significant level (5%). This indicates that (X) and (Y2) have a shared integration relationship or a long-term equilibrium connection.

3. Evaluating the calculated parameters (short-run).

This test estimates the short-run parameters to see how much the independent variable affects the dependent variable. In addition, it displays the error correction coefficient, which measures how quickly the model returns to equilibrium in the long run. The table below illustrates this.

Table 11: Outcomes of the Short-Term Relationship and Error Correction Model Estimation

ARDL Long Run Form and Bounds Test				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	6.860788	3.828977	1.791807	0.0948
Y1(-1)*	-0.450805	0.158205	-2.849494	0.0129
X**	-1.43E-05	3.22E-05	-0.446133	0.6623

Source: The table was prepared by the researcher based on the Eviews.12 program.

The relationship between oil revenues X and Y2 unemployment failed in the short term due to the probability exceeding the barrier (5%).

4. Evaluation of calculated parameters (long-term).

This test estimates the long-term parameters to assess the extent of the influence of the independent variable on the dependent variable and determine the nature of the long-term association as shown in the table below.

Table 12: Estimation Results of Long-Term Parameters

Levels Equation				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
X	-3.18E-05	6.49E-05	-0.490469	0.6314
C	15.21897	4.133118	3.682202	0.0025
EC = Y1 - (0.0556*X + 655.3254)				

Source: The table was prepared by the researcher based on the Eviews.12 program.

The relationship between oil revenues X and Y2 unemployment failed in the long term due to the probability exceeding the barrier (5%).

5. Autocorrelation problem test

Table 13: Sequence Correlation Test for LM Test

Breusch-Godfrey Serial Correlation Lagrange Multiplier Test:			
F-statistic	0.063624	Prob. F(2,66)	0.9384
Obs*R-squared	0.136626	Prob. Chi-Square(2)	0.9340

Source: The table was prepared by the researcher based on the Eviews.12 program.

The test findings indicate that the estimated model is free from autocorrelation issues since the statistical value of (F) is not significant.

6-Test the problem of homogeneity of variance

Table 14: Heteroskedasticity Test – ARCH

Heteroskedasticity Test: ARCH			
F-statistic	0.078037	Prob. F(1,68)	0.7808
Obs*R-squared	0.080240	Prob. Chi-Square(1)	0.7770

Source: The table was prepared by the researcher based on the Eviews.12 program.

The test findings indicate that the estimated model does not exhibit homogeneity inequality since the statistical value of (F) is not significant.

Fourth: Estimating the impact of oil revenues on carbon dioxide emissions Y3.

1. Test the ARDL self-regression model.

Upon performing the unit root test on the economic variables, it was determined that they were stationary at both the level and the first difference (1). With this criterion met, we proceeded to apply the ARDL model test, and the table below presents the findings for this model.

Table 15: Preliminary Assessment Results of ARDL Test Model.

Method: ARDL			
R-square	0.831070	Mean Dependent Variance	3.687308
Adjusted R-square	0.806937	Standard Deviation Dependent Variance	0.500008
S.E. of regression	0.219698	Akaike Information Criterion	-0.034339
Sum squared resid	0.675742	Schwartz Criterion	0.112699
Log-likelihood	3.291882	Hannan-Cohen Criterion	-0.019723
F-statistic	34.43719	Durbin-Watson Statistics	1.689886
Prob(F-statistic)	0.000004		
*Note: P-values and any subsequent tests do not account for model selection.			

Source: The table was prepared by the researcher based on the Eviews.12 program.

The table above presents the results of the explanatory power of the Adjusted R-squared test, indicating that 80% of the variations in the dependent variable (carbon dioxide emissions Y3) are attributable to the independent variable (X). Additionally, the F-test demonstrates the overall statistical significance of the model, while the Durbin-Watson statistic confirms the absence of autocorrelation.

2. Bound Test results.

To ensure that there is a long-run equilibrium relationship (co-integration) between (X) as an independent variable and (Y2) as a dependent variable, it is necessary to perform a bounds test, as shown in the table below:

Table 16: Bound Test results.

Statistical Test	value	K
F-Statistician	4.985634	1
(Critical Restricted Value)		
Morale level	I0 binding	I1 Binding
5%	3.62	4.16

Source: The table was prepared by the researcher based on the Eviews.12 program.

The aforementioned table indicates that the computed F-statistic value is 4.985634, above the tabulated value at a significance level of (5%). This implies a shared integration connection between (X) and (Y3), indicating a long-term equilibrium relationship.

3. Evaluate the calculated parameters (short-term).

This test estimates short-term parameters to assess the impact of the independent variable on the dependent variable, and it also presents the error correction coefficient, which quantifies the model's rate of return to long-term equilibrium. The table below illustrates this.

Table 17: Results of Estimating the Error Correction Model and the Short-Term Relationship

ARDL Long Run Form and Bounds Test				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.578452	0.405755	1.425619	0.1759
Y3(-1)*	-0.215366	0.121631	-1.770648	0.0084
X**	4.77E-06	2.47E-06	1.930162	0.0241

Source: The table was prepared by the researcher based on the Eviews.12 program.

The table above shows the results in the short term:

1. A significant correlation exists between oil revenues (X) and carbon dioxide emissions (Y3); specifically, a (100%) rise in the oil returns index results in a 400% increase in carbon dioxide emissions (Y3) at a significance level of 0.0241.
2. B- The calculated association indicated that the error correction coefficient was (-0.215366), which is negative and significant, indicating a short-term equilibrium relationship between the variables (X) and (Y3), as well as a tendency towards a long-term equilibrium relationship.

3. Evaluate the calculated parameters (long-term).

This test estimates long-term parameters to assess the extent of the independent variable's effect on the dependent variable and to identify the nature of the long-term connection, as seen in the accompanying table.

Table 18: Estimation Results of Long-Term Parameters

Levels Equation				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
X	2.216705	1.28E-05	1.727461	0.0061
C	2.685900	0.670954	4.003107	0.0013
EC = Y3 - (2.216705*X + 2.685900)				

Source: The table was prepared by the researcher based on the Eviews.12 program.

A positive correlation exists between oil revenues (X1) and average per capita national income (Y1); specifically, a (100%) rise in the oil revenue index results in a (202%) increase in carbon dioxide emissions (Y3), with a probability level of (0.0061).

5-Autocorrelation problem test

Table 19: LM Test Chain Link Test

Breusch-Godfrey Serial Correlation Lagrange Multiplier Test:			
F-statistic	0.001475	Prob. F(2,65)	0.9985
Obs*R-squared	0.003222	Prob. Chi-Square(2)	0.9984

Source: The table was prepared by the researcher based on the Eviews.12 program.

The test findings indicate that the estimated model is free from autocorrelation issues since the statistical value of (F) is not significant.

6-Test the problem of homogeneity of variance

Table 20: Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH			
F-statistic	2.272045	Prob. F(1,68)	0.1364
Obs*R-squared	2.263249	Prob. Chi-Square(1)	0.1325

Source: The table was prepared by the researcher based on the Eviews.12 program.

The test findings indicate that the estimated model does not exhibit homogeneity inequality since the statistical value of (F) is not significant.

Conclusions and proposals

First: Conclusions

1. The research shows that the Iraqi economy depends heavily on one sector, which is the oil sector, which constitutes an imbalance in the financing of the public budget, as this sector dominates the exports of the Iraqi economy, and therefore, external shocks greatly affect the Iraqi economy.
2. The decline in oil prices led to a decrease in oil revenues from Iraq's oil exports, and that the oil revenues obtained by Iraq after 2003 or the increases were made through an increase in crude oil production and exports despite the decline in oil prices.
3. Oil revenues derived from the export of crude oil have not been invested optimally or rationally, and have not achieved positive results reflected in the indicators of debt development in Iraq.
4. The results indicate that the increase in oil revenues by (1%) contributes positively to the increase in the

average per capita national income by (0.03). Moreover, the existence of an error correction mechanism means that short-term deviations from equilibrium are corrected over time, supporting the long-term equilibrium relationship between oil revenues and per capita national income.) contributes positively to the increase in the average per capita national income by (0.05).

5. The relationship between oil revenues and unemployment fails to demonstrate statistical significance in both the short and long term, and the results suggest that probability levels exceed the traditional threshold of 5%, indicating insufficient evidence to support a meaningful relationship between oil revenues and unemployment over time. Therefore, the study concluded that there was no statistically significant relationship between oil revenues and unemployment, neither in the short term nor in the long term.
6. The results indicate a strong positive correlation between oil revenues and carbon dioxide emissions, indicating that higher oil revenues by 1% lead to a significant increase in carbon dioxide emissions by 4%. Furthermore, a negative error correction factor indicates a short-term equilibrium relationship between oil revenues and carbon dioxide emissions, with indications of long-term equilibrium trends as well. In the long term, the results showed a positive moral correlation; that is when the oil revenues index increases by (100%) it leads to an increase in carbon dioxide emissions by (202%).

Second: Proposals

1. Working to develop a clear strategy for sustainable development in Iraq has become an urgent necessity to eliminate the rentier advantage in the Iraqi economy and activate the role of other productive sectors to diversify the economic structure.
2. There is a need to ensure sustainable development, which requires the transition from a rent-based economy to a more diversified economy, continuous investment in human development (sustainable human development), and better communication with global markets in order to unleash Iraq's export capacity.
3. Work to rationalize the Iraqi government's spending of oil revenues in light of unstable conditions, as well as maximize their benefit, especially since oil is a depleted and non-renewable resource, and therefore its impact is reflected in ensuring sustainable development for future generations.
4. Giving absolute priority to the use of oil revenues in local and regional investment projects according to national and regional needs while reducing the high cost of importing consumer products and luxuries.
5. Work to establish a sovereign fund for economic stability by taking advantage of oil surpluses, where this fund can invest surpluses when oil prices rise and compensate for the shortage when crude oil prices fall.

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