

# Sustainable Economic Growth in Iraq: Role of Industrialization, Deforestation, Trade, Employment, Technology, and Agriculture

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In the present study, the sustainable economic growth of Iraq is evaluated by analyzing six key explanatory variables, namely industrialization, deforestation, trade, employment, and agricultural expansion, which is measured by arable land. The study utilizes a time series research design spanning from 2000 to 2021. A quantitative approach was adopted, and data were collected from the World Bank database. The study utilized FMOLS (fully modified ordinary least squares) and DOLS (dynamic ordinary least squares) regression techniques to investigate the relationship. Additionally, canonical cointegrating regression (CCR) estimation was employed as a robust estimator. The results reveal significant negative effects of employment and deforestation on GDP per capita (GDPC). Industrialization also negatively impacts GDPC, while trade shows a positive influence. On the other hand, arable land does not exhibit a significant impact on GDPC. Based on the findings, the research suggests several policy implications.

**Keywords:** Sustainable economic growth, Industrialization, Trade, Deforestation, Agricultural expansion

## 1. Introduction

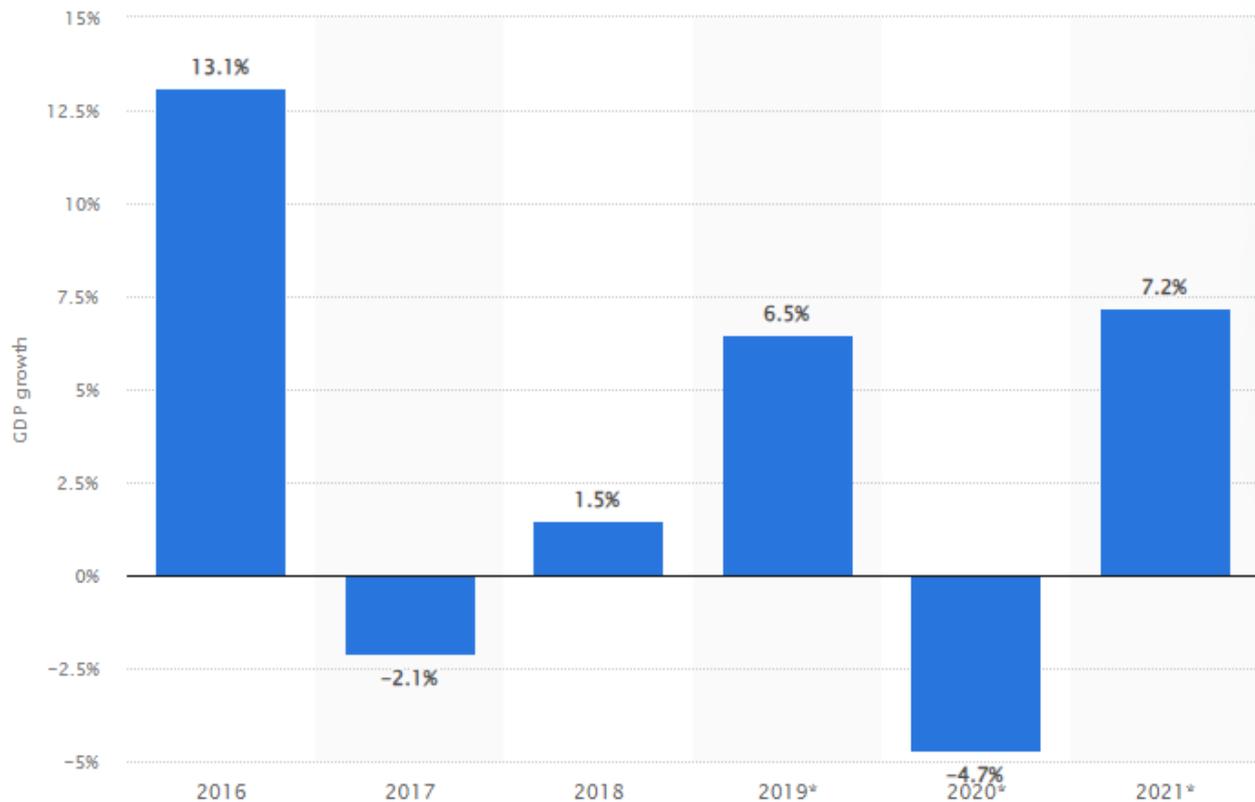
Sustainable economic growth implies that maintaining growth without economic complications is essential to maintain the country's economic structure. Sustainable economic development considers protecting natural resources and people's needs and requirements without provoking environmental threats (Awan, 2013). The development of Sustainable Development Goals (SDGs) ensures financial development and energy efficiency/growth in the East, Asian, and Pacific regions (Zakari et al., 2022). With the massive contribution of ICT, employment, and education, the Middle East region witnessed significant changes in economic growth. However, the sustainable conditions of this region are not much satisfactory compared to the OECD countries. The

technological innovations and the education trends in the respective areas are both found to be essential for sustainable economic growth (Habibi & Zabardast, 2020). Regarding the current sustainable situation in Iraq, the UN is actively supporting the sustainable goals in Iraq. The major sustainable areas that they emphasize include food security, well-being, green energy consumption, Industrial innovation, employment, and responsible consumption and production. The micro and macro environmental bodies in Iraq are observing these factors to guarantee the success of sustainable efforts in this region.

The agricultural sector of Iraq is vital for the economy of the country. Agriculture, forestry, and fishing add economic value and hold significant importance. Along with employment opportunities and industrial sustainable

innovations, agricultural expansion in a sustainable way is one of the effective measures to achieve sustainable economic goals. Despite the setbacks in the sector in the wake of climate change, the recovery and expansion of agricultural production are necessary to maintain food security in this region (Altameemi & Flayyih, 2021). It is evident from the previous studies that agricultural value added is significantly associated with sustainable economic growth and development. On the other hand, economic expansion is also found in a close relationship with energy utility and environmental degradation. Observing these factors from both perspectives is essential to assess the issue on the country level. The past research studies (Al-mousawi & Al-ghalibi, 2023; Ewaid, Abed, & Al-Ansari, 2020) also considered the socioeconomic

perspective on agriculture growth and economic development. The factors impacting economic growth, i.e., unemployment, trade imbalance, and lack of availability of sustainable tools and technology, also indirectly affect the agriculture business. It is also occurred that socioeconomic growth is rooted in multiple political, social, and economic country-level factors that determine Iraq's financial growth performance. Despite numerous research studies on these issues, the unavailability of research on sustainable economic development in the context of Iraq provides the base for the current study. The researcher acknowledges the need to examine these issues from multiple sources and the gaps they fill by identifying the association between economic and non-economic factors.



**Figure 1. Gross domestic product growth in Iraq from 2016 to 2021**  
Source: Statista 2023

The researcher, by taking into consideration the context of Iraq, aims to achieve the following research objectives: 1) To analyze the role of industrialization and technological advancement on sustainable economic growth, 2) To study the deforestation and agricultural expansion on sustainable economic growth, 3) To study the role of trade and employment in determining the sustainable economic growth of Iraq. The association between these factors is examined by adopting the quantitative research method and collecting data from secondary sources. The study has a specific research purpose as it covers the wide range of issues necessary to address to boost economic growth in Iraq. In the current geopolitical situation, taking responsible measures and doing strategic assessments is essential to handle sustainable economic challenges. The

study would contribute to the practical policy-making of economic value by providing a strong theoretical base for future policies and regulations.

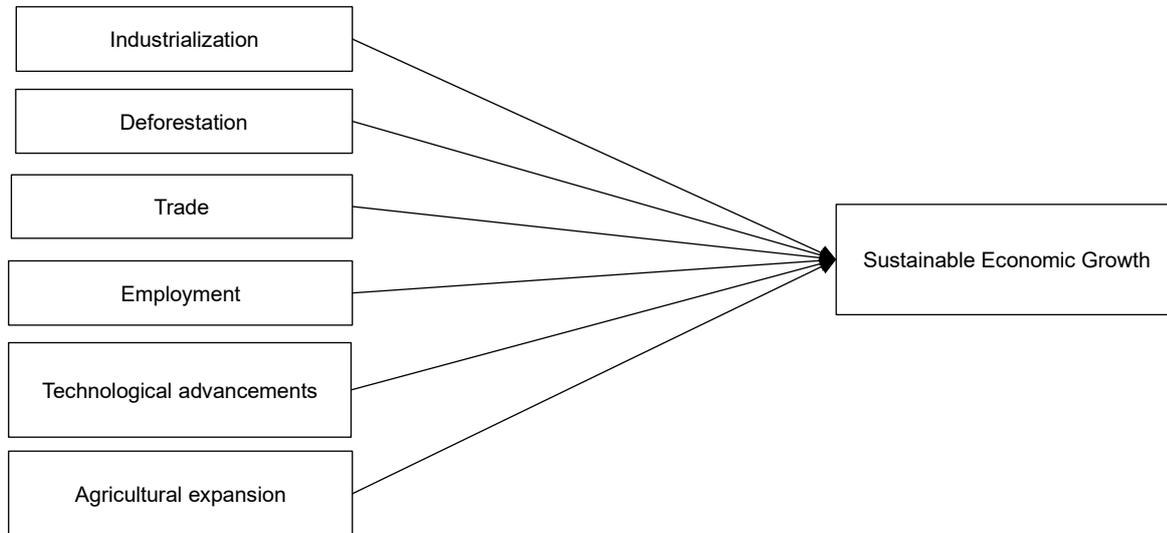
## 2. Literature Review

### 2.1. Theoretical Background

The present study explores the impact of industrialization, deforestation, trade, employment, technological advancements and agricultural expansion on the sustainable economic growth of Iraq. Sustainable economic growth refers to a type of economic development that fulfils the needs of the current generation without putting the potential of future generations to fulfil their needs at stake. It is concerned with attaining a balance between economic development, social progress, and

environmental conservation. The concept of sustainable development gained scholarly attention because of the negative aspects of the conventional economic growth models. The traditional models of the economic model have put immense strain on the natural environment due to the over-consumption of natural resources and exploitation of the natural environment (Hysa et al., 2020). The present study is based on the theory of green economy which is

based on the concept of sustainable development. It highlights various threats to environmental conservation due to rapid economic growth. The concept of green growth promotes economic development without compromising social inclusion, and the welfare of the present as well as future generations. It also stresses social equity to decrease the threats to environmental and ecological conservation (Pangarso et al., 2022).



**Figure 2.1: The Conceptual Framework**

## 2.2. The Impact of Industrialization on Sustainable Economic Growth 258

Rapid industrialization had led to great economic progress all over the world. However, it has also posed grave threats to the environment and society. The concept of sustainable economic growth addressed these challenges faced by the world due to conventional models of industrialization. The rapid industrialization is the primary driver of environmental degradation. Industries have caused an increase in pollution, habitat loss and resource exploitation. Various industries across the world are responsible for greenhouse gas emissions which have led to severe changes in climatic patterns (Wang & Su, 2019). The energy sector in Iraq is the primary source of greenhouse gas emissions in the region. Fugitive emissions contribute 48.2% to the total emissions of greenhouse gases, and 4.5 per cent from the industries based on the combustion of fuel. The construction industries in Iraq are responsible for 13.6% of total greenhouse gas emissions (Hashim et al., 2020). Moreover, the studies have shown that economic growth in Iraq has been natural resource-dependent so far which has led to environmental degradation in the country (Madani, 2020). Therefore, Iraq has introduced its mitigation program to reduce greenhouse gas emissions by 2030 by promoting sustainable practices in industries. Renewable energy resources, particularly solar energy and wind power are gaining attraction in Iraq where demands for electric power are increasing every year. Iraq has green solar resources which can be used to promote sustainable economic growth in the country (Al-Kayiem & Mohammad, 2019).

**H1:** *Industrialization has a significant negative impact on sustainable economic growth.*

## 2.3. Impact of Deforestation on Sustainable Economic Growth 232

Deforestation has far-reaching consequences for sustainable economic growth. Mostly, deforestation is driven by agricultural activities and urbanization. Forests are responsible for carbon absorption from the atmosphere, maintaining the fertility of the soil, and biodiversity conservation. Deforestation leads to increased carbon content in the atmosphere and threatens biodiversity. It also leads to the loss of water reserves and increases the frequency of natural hazards like floods and landslides. This leads to natural resource depletion and subsequent unsustainability in economic growth (Ellwanger et al., 2020). Over the last few decades, 80% of the armed conflicts and wars have taken place in forest areas of Iraq. This has led to the major destruction of forests and the loss of biodiversity and natural reserves. The studies have observed an increase in deforestation after the war ended. Furthermore, the government was more concerned with the well-being of the people and paid little to no attention towards forest restoration (Heidarlou et al., 2020). Moreover, poor governance has led to deforestation and environmental degradation in Iraq. The government reduced the subsidies on fuel after the crash in oil prices in 2014. As a result, people destroyed the forests to fulfil their fuel demand in the winter season. Thus, war conflicts and lack of political attention have led to deforestation and the loss of wildlife and natural resources in Iraq (Eklund et al., 2021).

**H2:** Deforestation has a significant and negative impact on sustainable economic growth.

#### 2.4. The Impact of Trade on Sustainable Economic Growth 205

Jassim, Salman, and Al-Taie (2021) revealed that the trade openness in the context of Iraq has led to negative impacts on the sustainable development of the industrial sector. The policy of trade openness has caused a disastrous imbalance in the structure of the country's economy which requires serious measures of mitigation. The liberal approach of Iraq towards trade has eradicated trade barriers to the import of goods. This has led to increasing trade competition for the local industries. Resultantly, the country is seeing a decline in the local industry. This has resulted in the deterioration of domestic industry, increased unemployment and economic imbalances. Similarly, Dadoosh and Alomary (2021) affirm that the unfair trade policies in Iraq have led to a trade imbalance in the region. Therefore, the country's exports are relatively cheaper than the local products. As a result of the trade openness policy implemented in 2003, Iraq became a net importer of various fraudulent and low-quality goods and services. Currently, Iraq is the main market of countries such as China, Iran and Turkey. This has led to unfair competition for the local industries.

**H3:** Trade has a significant and negative influence on sustainable economic growth.

#### 2.5. The Impact of Employment on Sustainable Economic Growth

Employment plays a significant role in the sustainable economic growth of a country. As it ensures an inclusive well-being of society and increases opportunities for an increase in economic productivity. Employment generates income for individuals and enables them to meet their fundamental needs and improve their living standards. It boosts the local economy as well (Frey, 2018). The employment rate in Iraq was 37.49% in 2019 and fell to 35.66% in 2020 as shown in the Figure 2.2. Moreover, the studies have revealed that millions of Iraqis are still displaced and the government has failed its Sunni population. Half of the population is facing poverty and unemployment. The government needs to create up to 340,000 jobs every year to keep a strict check on unemployment (Cordesman & Molot, 2019). According to the research conducted by Shaaibith, Daly, and Neama (2020), economic growth and employment have a significant impact on the inclusive welfare and growth of people. War and terrorism in Iraq from 1999-2017 have had drastic consequences on the country's economy and unemployment is one of the results of the armed conflicts.

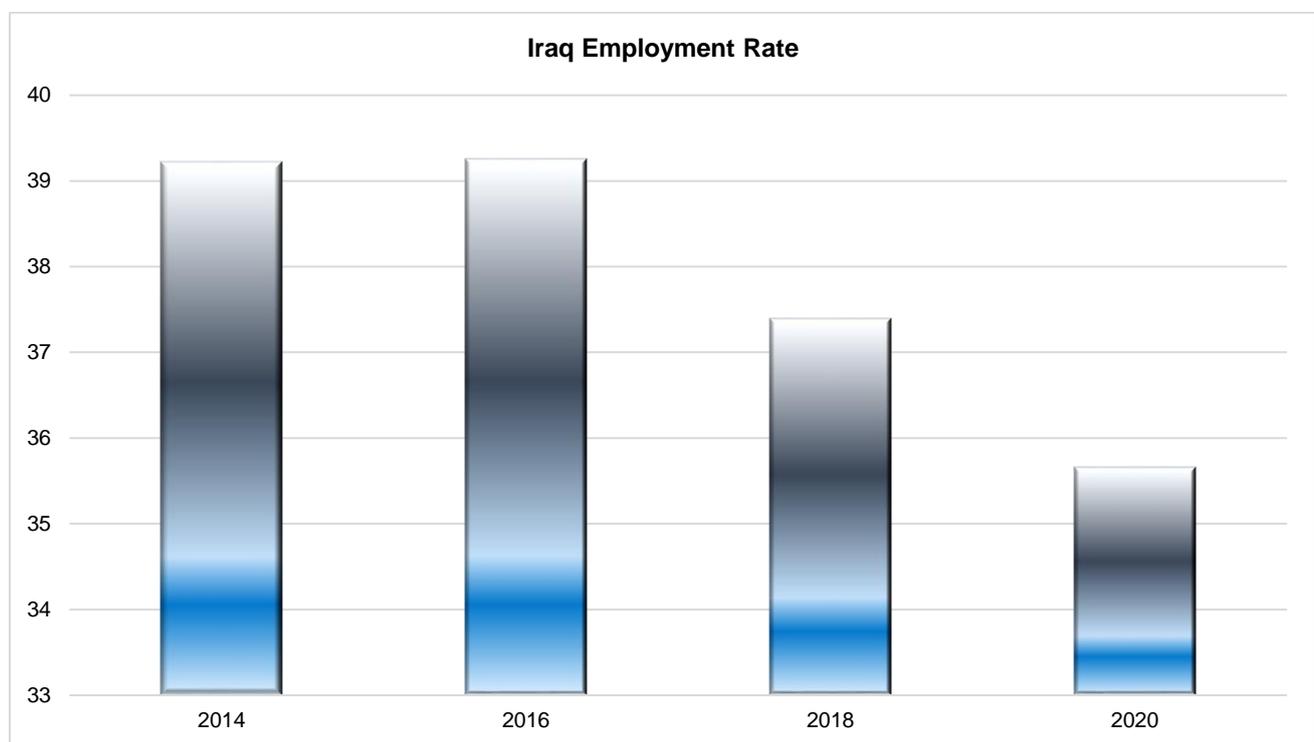


Figure 2.2: Central Statistical Organization Iraq (Economics, 2020)

**H4:** Employment has a significant and positive impact on the sustainable economic growth.

#### 2.6. The Impact of Technological Advancements on Sustainable Economic Growth 185

Over the past few decades, the technological advancements have reshaped the economy of various countries by introducing sustainable agricultural practices,

resource efficient technology, green infrastructure and economic diversification (Hickel & Kallis, 2020). Laffta and Al-rawi (2018) emphasized the incorporation of green technology in urban planning in Iraq. Green technology introduced environment-friendly strategies and programs that promote moderate consumption of natural resources, energy efficient economic programs, inclusive wellbeing of the society, and reliance on renewable energy resources

and thus contributes to achieve sustainable economic growth. [Jasim, Al-Maliki, and Al-Mamoori \(2022\)](#) revealed that rapid urbanization is taking place in Iraq without any attention towards green growth and green infrastructure. Moreover, there are unsustainable water management practices in the urban areas which can lead to water depletion and economic crisis in the country. [Abdulateef and Al-Alwan \(2022\)](#) affirmed that green infrastructure and technology can play a significant role in decreasing urban heat island in Baghdad city. This can help the country in mitigating the challenged posed by climate change and greenhouse gas emissions.

**H5:** *The Technological advancements have a significant and positive impact on sustainable economic growth.*

### 2.7. The Impact of Agricultural Expansion on Sustainable Economic Growth

The agricultural expansion promotes economic growth in the country but at the same time unsustainable agricultural practices cause environmental degradation and exploitation of natural reserves. For instance, unsustainable agricultural practices in Iraq have degraded the Mesopotamian Marshes which has led to loss of water reserves. Moreover, untreated agro-chemicals are contaminating water reserves which has impacted the quality of drinking water and led to loss of aquatic biodiversity. The traditional irrigation practices have increased the water salinity ([Price, 2018](#)). Various

unsustainable agricultural practices in Iraq are degrading the environment. The agriculture sector uses 40% of land and consumes 70% of natural reserves. The studies have revealed that agriculture sector is responsible for 25% of global greenhouse gas emissions. Moreover, agricultural expansion has also led to deforestation and severe climate changes. Therefore, the government needs to incorporate green and smart farming technologies in the agriculture sector because a sustainable economic growth in Iraq depends on sustainable agricultural development ([Aliyas, Ismail, & Alhadeedy, 2018](#)).

**H6:** *Agricultural expansion has a significant and negative impact on sustainable economic growth.*

### 3. Research Methodology

The present research aims to evaluate the sustainable economic growth of Iraq through six important explanatory variables: industrialization, deforestation, trade, employment, and agricultural expansion (proxy of arable land). For meeting this objective, the most suitable methodology is “quantitative secondary research”. Researchers, therefore, collected data by accessing the “world development indicator”, which enables users to find different indicators and how they can be gathered and visualized to assess various development trends ([Harris, Schiantarelli, & Siregar, 2000](#); [Swanson, 2006](#)). The present research has implemented a time series research design within 2000-2021. [Table 1](#) shows the variable description, its abbreviations, and the source of measuring these variables.

**Table 1: Description of variables**

Variable Names	Description	Abbreviation	Status	Source
Industrialization	In the present study, industrialization has been studied as the process of transformation of the economy of a country from a focus on agriculture to dependency on manufacturing ( <a href="#">Chenery et al., 1986</a> ).	IND	Independent variable	WDI
Deforestation	Deforestation is the intentional clearance of forest land ( <a href="#">Barbier &amp; Burgess, 2001</a> ).	DEFOREST	Independent variable	WDI
Trade	Trade can be understood as the voluntary exchange of goods and services among economic actors ( <a href="#">Copeland &amp; Taylor, 2004</a> ).	TRD	Independent Variable	WDI
Employment	Employment can be defined as the paid-mutual work arrangement between the employee and recruiter ( <a href="#">Frey &amp; Osborne, 2013</a> ).	EMP	Independent variable	WDI
Agricultural expansion	According to <a href="#">Laurance, Sayer, and Cassman (2014)</a> , agricultural expansion means transforming uncultivated land, including the natural forests, grasslands, woodlands and wetlands, into grazing land or crop area. It means having such a rate of economic growth that does not entail significant pressure on the prices of services, products, etc ( <a href="#">Kendiukhov &amp; Tvaronaviene, 2017</a> ). In the present research, it has been undertaken as an attempt to	AL proxy for Arable land	Independent variable	WDI
Sustainable Economic growth	satisfy the requirements of human beings but in such a way that sustains the natural resources and the ecological surroundings for future generations.	SEG	Dependent variable	WDI

To assess the impact of industrialization, deforestation, trade and employment on the sustainable economic growth of Iraq, the researcher has applied distinct techniques for data analysis. In the first step of data analysis, the researcher has applied a descriptive summary test to assess the main features of data and variables such as their normality characteristics, missing values, mean, median, minimum and maximum values, standard deviation, skewness etc. In the second step, the researcher applied the cointegration

Engle-Granger test ([Bilgili, 1998](#); [Lee & Lee, 2015](#)). When a single “co-integrating vector” Engle-Granger cointegration test can be used, this test assumes the simple intuition that if constructs are co-integrated, then the residual of the co-integrating regression must be stationary. So, the researcher has applied the Engle-Granger step that initiates the creation of residuals based on static regression and then examines the residuals for the existence of unit roots. The equation for the Cointegration test is stated below.

$y_{i,t} = \alpha_i + \delta_{i,t} + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \dots + \beta_n X_{n,i,t} + \varepsilon_{i,t}$   
 After applying the eagle-granger cointegration test, the researcher moved towards applying FMOLS and DOLS (Khan et al., 2019). The ordinary least square method is used to assess unknown parameters in the model. In this research, the researcher has implemented FMOLS and DOLS to assess the relationship among variables. The Fully modified ordinary least square method has been used by many researchers that aim to develop new techniques for estimating co-integrating coefficients. So, DOLS and FMOLS have been implemented to test the consistency of outcomes.

$$\beta_{NT}^* - \beta = \left( \sum_{t=1}^N L_{22t}^{-2} \sum_{t=1}^T (\chi_n - \bar{\chi}_U)^2 \right) \sum_{t=1}^N L_{11t}^{-1} L_{22t}^{-1} \left( \sum_{t=1}^T (\chi_a - \bar{\chi}_t) \mu_u^* - T \hat{\gamma}_t \right)$$

Where,

$$\mu_t^* = \mu_t - \frac{\hat{L}_{21t}}{\hat{L}_{tt2}} \Delta \chi_t, \hat{\gamma}_t = \hat{\Gamma}_{21t} \hat{\Omega}_{21t}^0 - \frac{\hat{L}_{21t}}{\hat{L}_{tt2}} (\hat{\Gamma}_{22t} + \hat{\Omega}_{22t}^0)$$

Compared to OLS, the FMOLS estimator eliminates the asymptotic bias and enhances efficiency by correcting both “long run serial correlation” in the endogeneity formulated through the long-run correlation between “u0t and u\*t”. The second technique applied is the “dynamic ordinary least square”. The DOLS technique is applied to attain the long-run estimates among variables. In the present

research, the researcher has implemented DOLS, an efficient and simple technique to estimate the “co-efficient of co-integrating associations”. In the last step, the researcher implemented the canonical co-integrating regression technique (Park, 1992). Recent research by Merlin and Chen (2021) has also implemented similar testing techniques. CCR is used to study the representation of similar co-integrating relationships as the “original model”. Researchers suggest using it in such studies that yield asymptotically effective chi-square estimators and tests. Furthermore, the “Breusch-Godfrey Serial Correlation LM test” and the “Heteroscedasticity test” has also been implemented by the researcher.

#### 4. Results

Descriptive statistics play a crucial role in evaluating the normality, presence of outliers, and symmetry of data. The table below presents a summary of descriptive statistics where the total number of observations used in the study is 22. Table 2 presents statistics of mean, standard deviation, skewness, Jarque-Bera (JB) test, and kurtosis. According to the recommended range for kurtosis (-7 to +7) and skewness (-2 to +2) (Joseph et al., 2010), all variables, except for GDPC, DEFOREST and AL, fall within the specified range. Similarly, the JB test's probability values indicate that these variables do not follow a normal distribution, as they have a p-value less than 0.05, indicating non-normality. EMP, IND and TRD have p-values greater than 0.05 which implies that the variables follow a normal distribution.

**Table 2: Descriptive Statistics**

	GDPG	EMP	DEFOREST	AL	IND	TRD
Mean	4.459785	22.76667	0.005774	10.11329	69.45441	85.44713
Median	4.051082	22.71820	0.004732	10.62968	69.18550	73.55308
Maximum	53.38179	25.43260	0.017953	11.88925	71.11900	154.2345
Minimum	-36.65815	20.30370	0.000000	0.000000	68.49600	54.58832
Std. Dev.	15.40055	1.864317	0.003625	2.464209	0.825629	27.97616
Skewness	0.591941	0.081832	1.927057	-3.301327	0.623432	1.014457
Kurtosis	7.740782	1.518013	7.219213	14.22161	2.077496	2.794614
Jarque-Bera	21.88687	2.037816	29.93462	155.3930	2.205209	3.812122
Probability	0.000018	0.360989	0.000000	0.000000	0.332005	0.148665
Sum	98.11527	500.8668	0.127025	222.4923	1527.997	1879.837
Sum Sq. Dev.	4980.716	72.98921	0.000276	127.5189	14.31492	16435.97
Observations	22	22	22	22	22	22

The Engle-Granger test for cointegration simplifies to an Augmented Dickey-Fuller (ADF) unit root test of the residuals from the cointegration regression. The null hypothesis presumes that there is no cointegration, i.e., residuals possess a unit root. With a p-value below 0.05, the null hypothesis is rejected, indicating that there is cointegration.

**Table 3: Cointegration Test**

	Value	Prob.*
Engle-Granger tau-statistic	-7.471535	0.0010
Engle-Granger z-statistic	-30.82989	0.0008

In the present study, the strength and direction of the impact of independent variables on sustainable economic growth through FMOLS, DOLS, and Canonical Cointegration Regression. The results of FMOLS and DOLS are displayed in Table 4 and 5, respectively. The results in Table 3 reveal that EMP negatively affects GDPC

in Iraq with a p-value of 0.087, indicating that the association is significant at a 10% significance level. Similarly, Table 4 confirms the negative influence of EMP on GDPC. However, with a p-value of 0.1049, the impact of EMP on GDPC is insignificant in the DOLS model. Secondly, deforestation is also negatively impacting GDPC. With a p-value < 0.01, the impact is significant at a 1% significance level, as shown in Tables 4 and 5. Additionally, industrialization has a negative and significant impact on GDPC (p= 0.039) in Table 4. Similarly, in the DOLS model, the results revealed a negative and significant association between IND and GDPC at a 5% significance level. Conversely, trade is found to positively impact GDPC in Iraq, and the association is significant with a p-value of 0.0067 in Table 4. Lastly, AL does not have a significant influence on GDPC in FMOLS and DOLS models, with p-values of

0.3067 and 0.3669, respectively. In Table 4, the R-squared value signifies that 49.7% of the variation in the model is justified by the predictors incorporated in the study.

**Table 4: Fully Modified Least Squares**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMP	-10.47860	5.635033	-1.859546	0.0827
DEFOREST	-5921.595	1193.645	-4.960934	0.0002
IND	-20.36709	9.026693	-2.256318	0.0394
TRD	0.813889	0.259190	3.140128	0.0067
AL	0.856336	0.808966	1.058555	0.3066
C	1614.451	739.0923	2.184370	0.0452
R-squared	0.497366	Mean dependent var		3.866362
Adjusted R-squared	0.329821	S.D. dependent var		15.52099
S.E. of regression	12.70618	Sum squared resid		2421.703
Long-run variance	60.64624			

**Table 5: Dynamic Least Squares**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMP	-10.15162	5.905708	-1.718950	0.1049
DEFOREST	-5556.023	1041.599	-5.334132	0.0001
IND	-21.07628	9.481399	-2.222908	0.0410
TRD	0.665752	0.244918	2.718258	0.0152
AL	0.781709	0.841857	0.928553	0.3669
C	1666.706	776.4320	2.146622	0.0475
R-squared	0.498015	Mean dependent var		4.459785
Adjusted R-squared	0.341145	S.D. dependent var		15.40055
S.E. of regression	12.50061	Sum squared resid		2500.245
Long-run variance	67.13813			

As shown by the findings of FMOLS and DOLS, EMP has a negative impact on GDPC in Iraq. However, contrary to the above results, EMP does not significantly impact GDPC in the CCR model. There is a negative and significant relationship between deforestation and GDPC, suggesting that increasing deforestation leads to a decline in the sustainable economic growth of Iraq. Industrialization is also causing a decline in GDPC as indicated by the negative coefficient; however, in the CCR model, IND does not have a significant impact on GDPC with a p-value of 0.2031. Trade positively and significantly impacts GDPC with a p-value of 0.022, leading to the support of the association at a 5% significance level. Similar to the results in Tables 4 and 5, AL does not have a significant impact on GDPC.

**Table 6: Canonical Cointegration Regression**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EMP	-13.42666	10.06024	-1.334625	0.2019
DEFOREST	-5437.491	1191.966	-4.561782	0.0004
IND	-24.01610	18.04701	-1.330752	0.2031
TRD	0.853961	0.334753	2.551017	0.0222
AL	0.469482	2.512043	0.186893	0.8542
C	1932.416	1438.746	1.343125	0.1992
R-squared	0.475041	Mean dependent var		3.866362
Adjusted R-squared	0.300055	S.D. dependent var		15.52099
S.E. of regression	12.98528	Sum squared resid		2529.262
Long-run variance	60.64624			

It is critical to ascertain that the econometric model does not have a serial correlation. The test results are displayed in Table 7. The Statistic-F and Chi-Square values showed no significance, at a significance level of 5%. Therefore, the researcher concluded that the model is free from the issue of autocorrelation and the null hypothesis stating no serial correlation is accepted.

**Table 7: Breusch-Godfrey Serial Correlation LM Test**

F-statistic	2.555332	Prob. F(2,15)	0.1109
Obs*R-squared	5.590795	Prob. Chi-Square(2)	0.0611

Lastly, Table 8 provides information about the presence or absence of heteroskedasticity, which is a significant concern in regression analysis. The results of the test, presented in Table 8, indicate that the variance of the error terms is constant, as evidenced by the F-probability value of 0.2457. Consequently, the results validate that there is no issue of heteroskedasticity in the model at a 5% significance level.

**Table 8: Heteroskedasticity Test: Harvey**

F-statistic	1.502514	Prob. F(4,17)	0.2457
Obs*R-squared	5.746236	Prob. Chi-Square(4)	0.2189
Scaled explained SS	6.585104	Prob. Chi-Square(4)	0.1595

## 5. Discussion

The primary aim of this study is to examine the determinants that can potentially impact sustainable economic growth in Iraq. In this accordance, the impact of industrialization (IND), deforestation (DEFOREST), trade (TRD), employment (EMP), agricultural expansion measured by arable land (AL), and technological advancement has been examined on sustainable economic growth. The association among variables has been drawn in the section of literature review, and findings related to these associations are discussed below:

This study suggests a positive and significant impact of IND on the overall GDP of the country. However, on the basis of the results, the relevant hypothesis has been rejected as the negative impact of IND on GDP has been identified. This outcome of the study is not validated by existing studies, as [Ndiaya and Lv \(2018\)](#) state that IND is positively associated with economic growth. However, the impact can be witnessed in a long way. Similar results have been generated by [Opoku and Yan \(2019\)](#), which bring forth IND as an important booster of economic growth. The discrepancy in results might be due to the slow process of industrialization in Iraq, which leads the negative outcome.

A positive and significant impact between DEFOREST and the economic growth of the country has also been assumed by this study. On the basis of the results, this association is also rejected as the negative impact of DEFOREST on GDP has been highlighted by the result. This result is validated by [Ajanaku and Collins \(2021\)](#), which indicates that deforestation and increased policies of forestation are not positively linked with economic growth. The studies of [Arshad et al. \(2020\)](#) also indicate that deforestation can enhance environmental pollution, which negatively impacts sustainable development in the longer run.

In the perspective of association formulated by this study, TRD is positively associated with economic growth. This association is validated by the findings of the study that indicates a positive impact of TRD on GDP. It implies that an increase in trade activities can potentially uplift the economic growth of a country. The findings of [Abendin and Duan \(2021\)](#) illustrate that trade has a significant and positive association with economic prosperity, and [Akadiri et al. \(2020\)](#) also find that efficient trade activities and policies and increased FDI can positively impact sustainable economic growth. Accordingly, as per the

outcomes of this study, the result of this study has been validated, and the positive impact of TRD on economic growth has been identified.

The other association of this study has bring forth the positive impact of EMP on economic growth. As per the results, the negative impact of EMP has been indicated on GDP resultantly this association assumed by this study is rejected. The existing studies offer contrasting results as in view of Seyfried (2011), EMP and economic growth are positively linked with each other as the increase in EMP enhances economic growth, and enhancement in economic growth exerts an immediate impact on EMP. The cause of the difference in the results of this study as compared to past studies is might be due to some mismanagement in data.

Furthermore, the impact of AL on economic growth is also positive and significant, as suggested by this study. However, as per the results of the study, a positive but insignificant impact has been examined. On the basis of insignificant impact, the respective association of the study has been rejected. Ben Jebli and Ben Youssef (2017) also indicate an insignificant impact of arable land use on GDP. However, Barbier (2004) indicates that expansion in agricultural land can be significantly correlated with economic development, but this impact follows the long run. On this basis, the outcomes of this study can be validated to some extent, as previous studies indicate mixed results in this aspect.

In addition to all these determinants, the positive association of technological development with economic growth has also been suggested by this study. However, due to a lack of responses on technological advancements within the context of Iraq, this determinant has been omitted. The cause of this omission is not yielding of authentic results due to the unavailability of relevant data.

## 5.1 Conclusion

This study aims to examine the sustainable economic growth in Iraq thus, the impact of IND, DEFORES, TRD, AL, and EM has been examined on economic growth. The data has been collected from secondary sources using a quantitative approach. In addition, a time span of 2000 to 2021 has been observed in this study while collecting the data. For analysis, remarkable tools like FMLOS, DOLS, and CCR are used. On the basis of results, it has been found that only TRD positively and significantly impacts economic growth. However, IND, DEFORES, and EM do not exert a positive impact on economic growth. Moreover, AL also insignificantly impacts economic growth. The outcomes of the study imply that to enhance sustainable economic growth within the context of Iraq, significant trade policies and activities should be enhanced. In this accordance, the findings of this study offer a significant contribution to policy-makers in Iraq.

## 5.2 Implications of the Study

### • Theoretical Implications

This study can offer significant theoretical contributions to understand the notable impact of trade on economic growth. An efficient understanding of the association

between determinants that impact economic growth can help the formulation of theories and concepts associated with economic growth. Moreover, a lack of such study within the context of Iraq expands the literature and enhances the learning of scholars in Iraq.

### • Practical Implications

This study has significant implications for economists, practitioners of different sectors, and policy-makers of the respective country. Outlining the positive impact of numerous variables on economic growth, this paper enhances the insight of policy-makers to keenly consider those aspects which offer more efficient results. In this accordance, the formulation of policies related to trade activities should be focused by the policy-makers. Furthermore, the practitioners of various sectors (industrial, manufacturing, and agricultural) can also understand the aspects which can encourage them to increase their productivity to significantly contribute to the economic growth of their respective countries.

## 5.3 Limitations

It is impossible to cover all aspects in one study therefore, besides its contributions, this paper has some limitations as well. To examine the impact of selected variables on economic development, this paper was limited to the context of Iraq. This limitation can impact the effectiveness and generalizability of the results. Following the quantitative approach, a secondary way of data collection has been utilized by the researcher, which impacts the reliability of the results. The data has been collected from a limited time frame, i.e., from 2000 to 2021, which impacts the overall effectiveness of results. Besides this, very specific determinants have been considered in this study which does not offer a broader picture of sustainable economic development.

## 5.4 Future Research Indications

On the basis of mentioned limitations, following directions can be recommended to future researchers.

- Future studies should consider the usage of primary data for more reliable results. A survey-based or interview-based study can be conducted in this regard.
- A cross-border study should be conducted to examine if the impact of selected determinants has changed on the economic development of other countries.
- Other determinants of economic development like socio-political aspect, human resources, natural resources, and capital formation, have also been considered by future studies to provide a broader overview of economic development.
- Data from a longer time span should be considered to offer more efficient outcomes.

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