Analytical and Foresight Study of the Performance of Non-Oil Economic Sectors in Algeria: A Future Vision for 2030

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***Abstract*:**

This study aims to forecast the performance of non-oil economic sectors in Algeria, providing a future vision for 2030 with the goal of assessing their potential to strengthen the national economy and achieve sustainable development goals. The study is based on analyzing key economic indicators, using the four objectives of Kaldor's model to evaluate the current status of these sectors, their performance trends, and their impact on GDP, employment, and foreign trade. A predictive methodology was adopted, utilizing the Holt-Winters exponential smoothing method to estimate future contributions of these sectors to GDP value-added.

The results indicate a weak performance in the non-oil sectors, despite limited signs of economic diversification. Based on these findings, it is clear that economic diversification remains an essential challenge, representing a vital path for Algeria's alternative potential towards achieving sustainable development and enhancing the national economy's competitiveness.

Keywords: *economic indicators, Kaldor model, economic diversification, Holt-Winters exponential smoothing.*
Jel Classification Codes : *O47 ; C82 ; C53.*

***Résumé*:**

Cette étude vise à anticiper la performance des secteurs économiques non pétroliers en Algérie, en présentant une vision future pour 2030 dans le but d'évaluer leur potentiel à renforcer l'économie nationale et à atteindre les objectifs de développement durable. L'étude repose sur l'analyse des principaux indicateurs économiques, en se basant sur les quatre objectifs du modèle de Kaldor pour évaluer l'état actuel de ces secteurs, leurs tendances de performance, ainsi que leur impact sur le PIB, l'emploi et le commerce extérieur. Une méthodologie prédictive a été adoptée, utilisant la méthode de lissage exponentiel de Holt-Winters pour estimer les contributions futures de ces secteurs à la valeur ajoutée du PIB.

Les résultats révèlent une performance faible des secteurs non pétroliers, malgré des signes limités de transition vers une diversification économique. Ces résultats montrent que la diversification économique représente un défi incontournable, constituant une voie essentielle pour le potentiel alternatif de l'Algérie afin d'atteindre un développement durable et de renforcer la compétitivité de l'économie nationale.

Mots clés: *indicateurs économiques, modèle de Kaldor, diversification économique, lissage exponentiel de Holt-Winters.*

Jel Classification Codes : *O47 ; C82 ; C53.*

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I. Introduction:

In light of global economic challenges and the structural transformations occurring in the world economy, diversifying national income sources has become a strategic goal to ensure sustainable economic stability. As Algeria is one of the countries that heavily relies on the hydrocarbon sector, this dependence poses a clear challenge amidst fluctuations in oil prices and their direct impact on public revenues, highlighting the urgent need for effective strategies to reduce this reliance and enhance the resilience of the national economy.

Non-oil sectors are essential pillars for achieving this diversification, playing a vital role in stimulating economic growth and enhancing its sustainability. To this end, the Algerian government has implemented several strategies aimed at revitalizing these sectors, including tax incentives, infrastructure development, and strengthening cooperation between the public and private sectors. However, the success of these policies requires a clear and integrated future vision that combines economic and social policies, enabling Algeria to respond to future challenges and build a diversified and sustainable economy.

From this perspective, the following problem can be raised: **What are the key indicators of non-oil economic sectors that can contribute to strengthening the national economy and achieving sustainable development goals by 2030?**

1.1 Study Hypotheses:

In light of the posed problem, the following hypotheses can be suggested:

- Non-oil sectors contribute to increasing GDP.
- These sectors lead to the creation of new job opportunities and a reduction in the unemployment rate.
- Developing non-oil sectors will reduce dependence on the hydrocarbon sector and decrease the trade deficit.
- Non-oil sectors will help achieve sustainable development goals by 2030.

1.2 Importance of the Study:

The importance of this study lies in the role of non-oil economic sectors in reducing dependence on the hydrocarbon sector and striving for the adoption of an effective government policy for diversifying the Algerian economy. It also aims to identify the leading sectors for economic growth and provide a foresight vision for them.

1.3 Objectives of the Study:

- Identify the key indicators reflecting the state of the economy.
- Study the reality of other economic sectors in Algeria.
- Assess the efforts for economic diversification in Algeria.
- Provide a foresight vision for the trajectory of economic sector indicators in Algeria.

1.4 Methodology of the Study:

The study relies on descriptive and inductive methodologies, aiming to provide clear and comprehensive concepts for the research topic and analyze data related to the Algerian economy.

1.5 Literature Review:

Numerous studies have addressed the diversification of the Algerian economy and the performance of non-oil sectors, shedding light on the challenges and future prospects of economic diversification. Some of these studies include:

1) ***A Study by Researchers (Amar and Lazhar, 2019)*** titled "The Algerian Economy Diversification Model to Exit Hydrocarbon Dependence - A Foresight Vision": This study analyzed the effectiveness of the economic diversification model adopted by Algeria since 2016. The researchers utilized the Herfindahl-Hirschman Index to measure the level of economic diversification. The study concluded that the Algerian economy did not witness significant diversification in the structure of gross domestic production and exports during the period (2012-2016), reflecting a continued reliance on the hydrocarbon sector. Nevertheless, the study considered economic diversification as a future opportunity to mitigate risks associated with hydrocarbon dependence.
2) ***A Study by Researchers (Bouguerra & Bouchelaghem, 2021)*** titled "The Reality of Economic Diversification in Algeria Outside the Hydrocarbon Sector: An Econometric Analytical Study for the Period (1990-2020)": This study assessed the level of economic diversification in Algeria by analyzing the impact and contribution of non-oil sectors to economic growth. The results indicated a weak degree of economic diversification in Algeria, with a long-term cointegration relationship among the study variables. The study emphasized that focusing on diversifying products in industrial, agricultural, and service sectors would positively contribute to increasing GDP.
3) ***Study by Researcher (Ben Daoudia, 2022)*** titled "Structural Transformation of the Algerian Economy within the Framework of the New Economic Growth Program for the Period (2016-2030)": This study relied on analyzing structural transformation indicators before and after the implementation of the program. The study concluded that the Algerian economy suffers from slow structural transformation due to the state's declining ability to maintain growth through public investments and the weakness of institutions, with a continued heavy reliance on the hydrocarbon sector. It also highlighted the need to accelerate economic diversification and develop the private sector to enhance productivity.
4) ***A Study by Researcher (Makhlouf, 2022)*** titled "Measuring the Impact of Non-Oil Sectors on GDP in Algeria": This paper analyzed diversification policies and their measurement indicators, in addition to estimating the impact of non-oil sectors on GDP using two models with ordinary least squares for the period (2000-2020). The results showed that successful economic diversification requires encouraging private investment and providing transparency and economic openness. The study also indicated that the Algerian economy relies more on labor intensity than on capital, with agricultural, manufacturing, and service sectors contributing effectively to GDP formation.

II. Analysis of the Economic Performance of Non-Oil Sectors in Algeria:

Before analyzing the indicators of the various economic sectors in Algeria, it is essential to start by clarifying the key indicators that reflect the overall state of the economy. These indicators play a crucial role in understanding the performance of productive sectors and in assessing their progress or decline.

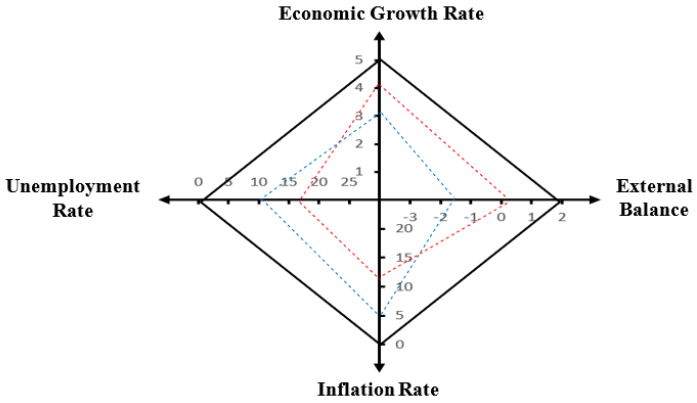
II.1 Key Indicators Reflecting the State of the Economy:

Any economic policy, whether in developing or developed countries, must define its main objectives. In 1960, economist Nicholas Kaldor (N. Kaldor) introduced a model known as the "Magic Square", which outlines the key goals of economic policies. This model has been widely accepted by economists and international economic organizations (Miyah, 2009-2010, p. 08). These goals are focused on four main areas (Ali Ibrahim, 2019, p. 129):

1) ***Achieving Economic Growth:*** The economic growth rate should be 6%, higher than the population growth rate;
2) ***Achieving Price Stability:*** The inflation rate should be zero, with GDP growth between 5% and 6% annually;
3) ***Achieving Full Employment:*** The unemployment rate should be zero, with full utilization of productive capacity;
4) ***Achieving External Balance:*** The balance of payments should ideally be in surplus by 2%.

The Kaldor's Magic Square model can be illustrated in the following figure:

Fig. (01): Kaldor's Magic Square



Source: (Ratoul & Krouch, 2014, p. 92).

According to this perspective, the economic situation of any country improves as the area of the Magic Square (represented by the dotted line) increases, reflecting a balanced achievement of the four economic goals: zero unemployment, zero inflation, a high economic growth rate, and a surplus in the balance of payments. The closer a country gets to achieving these criteria, the stronger and more stable its economy becomes.

These indicators help provide a comprehensive picture of the economy as a whole, allowing for the evaluation of economic policies and the success of various sectors in driving economic growth and achieving sustainable development outside the hydrocarbon sector. The key indicators that reflect the state of the economy can be summarized as follows:

II.1.1 Economic Indicators: Economic indicators are quantitative data and statistics that reflect the economic condition of a country over a specific period. These

indicators include measuring economic growth rates and the distribution of wealth among individuals in society by analyzing the Gross Domestic Product (GDP) and its distribution across economic sectors and expenditure items (Hasaf, 2008, p. 127).

GDP is used as a primary measure of the size of an economy, calculated based on the value of goods and services produced from locally available resources over a specific period. GDP has become a prominent indicator in evaluating the performance of modern economies, reflecting conditions of economic stability or recession (Lazaar & Jdi, 2013, p. 65).

II.1.2 Social Indicators: These indicators can be summarized in elements that ensure justice in the distribution of resources and provide opportunities for every individual in the areas of health, education, employment, and poverty alleviation. Studying the social characteristics of the workforce analyzes the nature of social variables that constitute the active population, which is ready to contribute to development efforts within the country. These characteristics are represented in the qualitative and age structure of the workforce.

The size of the labor force and the growth rate represent those willing and able to work, while the unemployment rate reflects the number of non-working individuals as a percentage of the labor force. It is well known that good economic performance is always associated with a reduction in the unemployment rate (Lazaar & Jdi, 2013, pp. 66-72).

II.1.3 Foreign Trade Indicators: No economy can be active in isolation from the outside world; countries must enhance their interactions with the international economy to exploit available opportunities. Integration into the global economy not only allows for access to goods and services that are not produced locally but also contributes to the transfer of expertise and knowledge that aids in the development of local production methods. Many economies rely on exporting local products. In modern economies, the role of foreign trade is a vital element, serving as an indicator of the strength of the economy and its ability to withstand external crises and shocks (Rahal & Breika, 2018-2019, p. 161).

II.2 The Reality of the Algerian Economy According to Kaldor's Model:

In the framework of Kaldor's model, the reality of the Algerian economy can be assessed based on the four core objectives he established. This can be done by comparing data related to economic growth rates, inflation, unemployment, and external balance, as outlined in the following table:

Table (01): Evolution of Kaldor's Magic Square Indicators in the Algerian Economy (2001-2023).

Years	Economic Growth Rate	Unemployment Rate	Inflation Rate	External Balance
2001	3	27,3	4,23	6,19
2002	5,4	25,7	1,42	3,66
2003	6,5	23,7	2,6	7,468
2004	4,5	17,7	3,97	9,25
2005	5,4	15,3	1,38	16,94
2006	2,9	12,3	2,31	17,73
2007	3,1	13,8	3,68	29,55

2008	2,5	11,3	4,86	36,99
2009	1,2	10,2	5,74	3,859
2010	4,8	10	3,91	15,326
2011	3	10	4,52	20,141
2012	2,4	11	8,89	12,057
2013	2,6	9,8	3,26	0,133
2014	4,1	10,6	2,92	-5,881
2015	3,2	11,2	4,78	-27,537
2016	3,9	10,5	6,4	-26,031
2017	1,5	11,7	5,59	-21,762
2018	1,4	11,7	4,27	-15,82
2019	0,9	10,5	1,95	-16,927
2020	-5,1	12,6	2,41	-16,369
2021	3,8	12,7	7,23	-1,479
2022	3,6	12,4	9,27	18,468
2023	4,1	11,8	9,32	6,347

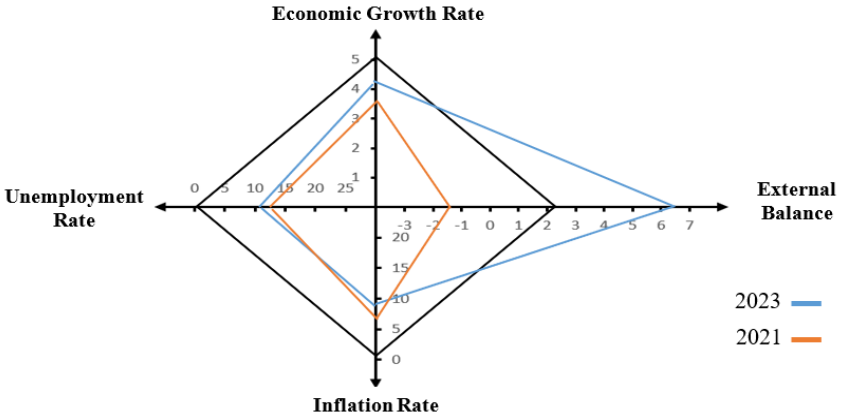
Source: Prepared by the researchers based on: Bank of Algeria, National Office of Statistics, and the website https://ar.tradingeconomics.com/algeria/unemployment-rate

The table presents the evolution of Kaldor's Magic Square indicators in the Algerian economy from 2001 to 2023, which includes the following:

1) ***Economic Growth Rate*:** The economic growth rate in Algeria experienced significant fluctuations over the years. In 2008, economic growth was at its lowest (2,5%) and continued to decline until reaching negative growth (-5,1%) in 2020, reflecting the impacts of the COVID-19 pandemic. However, the economy began to recover in 2021, recording a growth rate of 3,8%.
2) ***Unemployment Rate:*** The unemployment rate was high at the beginning of the period, reaching 27,3% in 2001, but it saw a notable decline over the years, stabilizing between 10-12% in recent years. However, this rate remains relatively high and reflects structural challenges in the Algerian labor market.
3) ***Inflation Rate:*** Inflation was unstable, starting low in 2001 at 4,23% but increasing in subsequent years, reaching 9,32% in 2023. The rise in inflation is associated with changes in energy prices and fluctuations in international markets.
4) ***External Balance:*** The external balance shows significant variation. It was strongly positive during the first decade of the millennium, peaking in 2008 (36,99%). However, with the collapse in oil prices and increasing reliance on imports, the external balance turned into a clear deficit between 2014 and 2020. With the recovery of oil prices and economic reforms, the external balance began to improve again in 2022 and 2023.

To provide a clearer illustration, we have drawn Kaldor's Magic Square goals for the Algerian economy for the years 2021 and 2023, as shown in the following figure:

Fig. (02): Evolution of Kaldor's Magic Square Indicators in the Algerian Economy for 2021 and 2023.



Source: Prepared by the researchers based on Table (01).

The figure shows that Algeria, despite the reforms and development programs that have been implemented, still faces significant challenges in achieving all the goals of Kaldor's Magic Square. The blue square for 2023 shows a notable expansion compared to the red square for 2021, reflecting a general improvement in the economic situation.

This improvement is evident in the four key indicators that Kaldor's model relies on. The economic growth rate increased from 3,8% in 2021 to 4,1% in 2023, indicating a relative improvement in overall economic performance. Additionally, the unemployment rate saw a slight decrease from 12,7% in 2021 to 11,8% in 2023, reflecting a moderate improvement in the labor market.

Conversely, the inflation rate rose significantly from 7.23% in 2021 to 9.32% in 2023, indicating rising inflationary pressures and challenges to the Algerian economy's ability to achieve price stability. However, the external balance improved markedly, shifting from a deficit of -1,479% in 2021 to a surplus of 6,347% in 2023, demonstrating the economy's ability to adapt to external shocks.

However, the Algerian economy continues to face significant challenges in diversifying its economic sources and reducing its dependence on the energy sector. Despite the slight improvements seen in growth rates and external balance in recent years, the excessive reliance on hydrocarbons remains a barrier to achieving sustainable and balanced growth. This concentration in a single sector leaves the economy vulnerable to fluctuations in oil and gas prices, limiting its ability to effectively respond to global crises.

Nevertheless, the Algerian economy still needs greater efforts to diversify its economic sources and reduce reliance on the energy sector. Moreover, it is essential to adopt more effective policies to control unemployment and inflation rates to ensure long-term economic stability. This requires clear strategies to develop non-oil sectors and enhance public investment in infrastructure and productive services to support inclusive growth and achieve Kaldor's goals comprehensively.

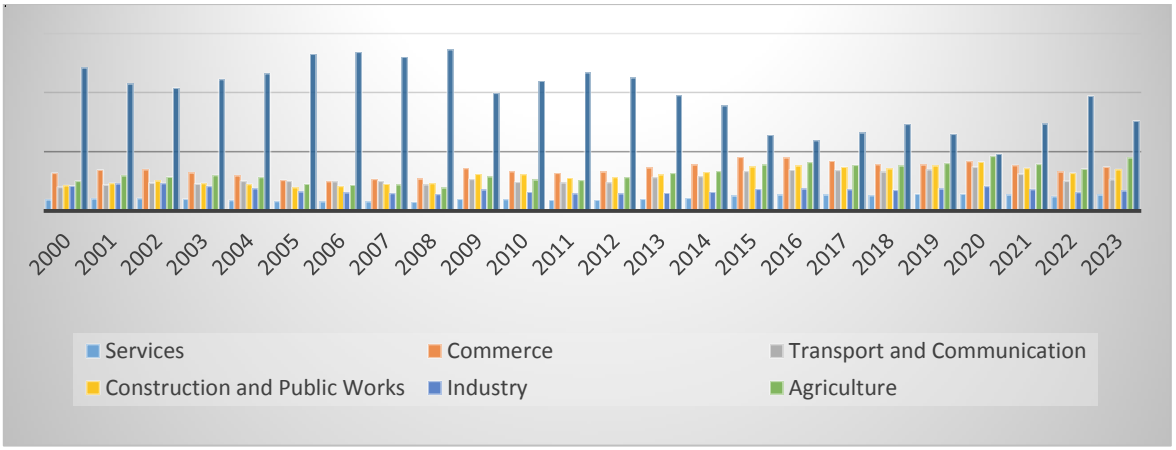
II.3 Reality of Non-Oil Economic Sectors in Algeria:

To analyze the reality of productive sectors in Algeria, it is essential to consider a set of key indicators that reflect economic performance and contribute to assessing the efficiency of these sectors. These indicators include the following:

II.3.1 Contributions of Economic Sectors to Gross Domestic Product (GDP):

To determine the contribution of various economic sectors to total production, we use the aggregate of gross domestic product as an indicator of economic growth rather than the total output. This choice is based on the use of value-added statistics for economic sectors, which are calculated according to the National Economic Accounting System (S.C.E.N). This standard serves as a fundamental tool for identifying the sectors that most contribute to the value added in the gross domestic product (Dheif & Azouz, 2018, p. 27). The contribution of value added for each sector to the gross domestic product can be illustrated in the following figure:

Fig. (03): Contribution of Economic Sectors to the Formation of Gross Domestic Product (GDP) for the Period 2000-2023.



Source: Prepared by the researchers based on Appendix No. 01.

From the figure, several important trends and changes in the structure of the Algerian economy are evident. It is observed that the largest share of the GDP in Algeria is constituted by the hydrocarbons sector, which is the cornerstone of the economy. However, its contribution has significantly declined, decreasing from 48.3% in 2000 to 19.26% in 2020, before rising again to 30.43% in 2023. This decline reflects the efforts made to diversify the Algerian economy and reduce reliance on oil, in addition to the impact of fluctuations in oil prices.

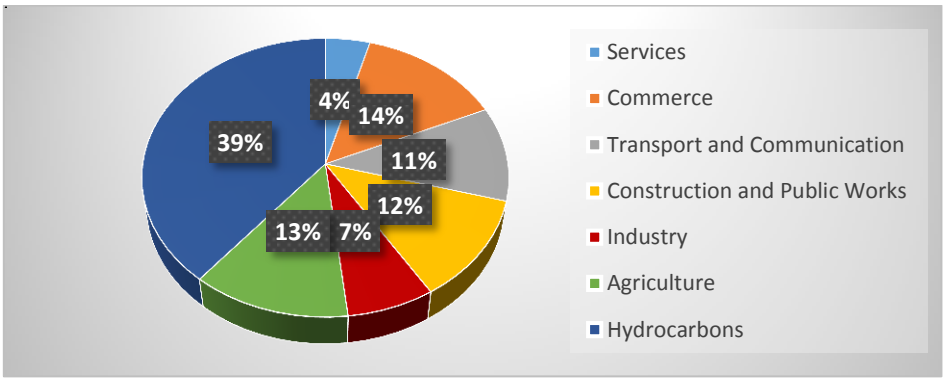
As for the agriculture sector, it has seen slight but continuous development, with its contribution rising from 10.09% in 2000 to 17.95% in 2023, indicating government efforts to enhance food security. On the other hand, the industrial sector has shown relative stability, with contributions ranging from 5% to 9% throughout the study period, suggesting that the industrial sector has not played a significant role in supporting economic diversification in Algeria compared to other sectors.

In contrast, the trade sector has experienced notable growth in its contribution, increasing from 12.72% in 2000 to 18.13% in 2015, as a result of increased commercial activities and responses to economic globalization. The transport and

communications sector has also witnessed substantial growth, with its contribution rising from 8.04% in 2000 to 14.82% in 2020. This increase reflects the development of infrastructure and growing investments in this area.

Regarding the services sector, there has been a slight increase, with its contribution rising from 3.8% in 2000 to 5.43% in 2023, indicating a growing demand for modern services. Meanwhile, the construction and public works sector has seen significant growth, with its contribution rising from 8.51% in 2000 to 16.56% in 2020, reflecting the considerable efforts made by the government in developing infrastructure and promoting the construction sector.

Fig. (04): Average contribution rates of economic sectors to the formation of GDP during the period 2000-2023.



Source: Prepared by the researchers based on Appendix No. 01.

From the circular figure, a significant disparity in the average contribution rates of economic sectors to the Gross Domestic Product (GDP) during the period 2000-2023 is evident. The dominance of the hydrocarbons sector is clear, contributing approximately 39%, underscoring its position as a key driver of the Algerian economy. This is followed by the trade sector with an average contribution of 14%, then the agricultural sector and the construction and public works sector, with averages of 13% and 12% respectively. These are closely matched percentages that reflect the importance of these sectors in supporting the economy. The transport and communications sector recorded an average contribution of 11%. In contrast, the contributions from the industrial sector (excluding hydrocarbons) and the services sector were the lowest, with averages of 7% and 4% respectively, which are weak compared to other sectors.

Overall, this analysis reflects Algeria's efforts to diversify its economy and reduce its heavy reliance on the hydrocarbons sector by enhancing contributions from other sectors such as agriculture, trade, and transport. However, structural challenges remain, necessitating the promotion of sectors with high added value to achieve sustainable development and drive economic growth.

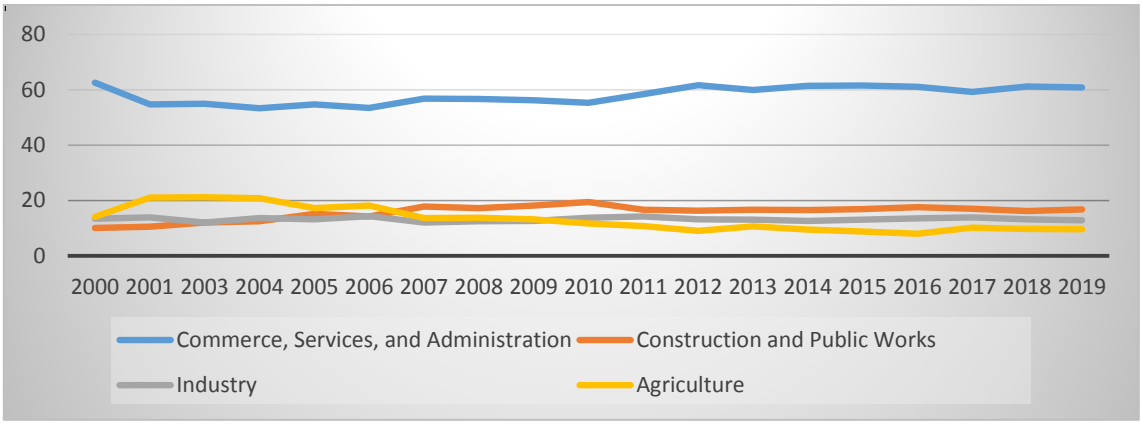
II.3.2 Contributions of Economic Sectors to Employment:

The contribution of economic sectors to employment is a critical social indicator, as these sectors play a significant role in creating job opportunities and reducing unemployment rates. This, in turn, contributes to improving individuals' living standards, mitigating poverty and hunger, and thus reducing social issues that could

negatively affect the national economy as a whole.

By studying the distribution of employment across economic sectors, we can evaluate the capacity of these sectors to provide job opportunities, reflecting the strength and impact of each sector in supporting social and economic development. The following figure will illustrate the percentage of employed individuals by sector during the period from 2000 to 2019.

Fig. (05): Distribution of employed individuals by economic sectors in Algeria for the period 2000-2019.



Source: Prepared by the researchers based on Appendix No. 02.

Through the analysis of the distribution of employment rates by economic sectors in Algeria for the period 2000-2019, it becomes clear that the Algerian labor market has undergone significant transformations. The commerce, services, and administration sector accounted for the largest share of employment, exceeding 60% in most years. This sector witnessed a notable increase in its workforce, rising from 54.68% in 2001 to 60.79% in 2019, reflecting the growing reliance on this sector due to the development of services and the increase in commercial activities.

In contrast, the agriculture sector experienced a sharp decline in employment rates, with the percentage dropping from 21.13% in 2003 to 9.6% in 2019, due to rural exodus and the movement of labor to other sectors, particularly the services sector. The construction and public works sector experienced fluctuations in employment rates, rising from 9.99% at the beginning of the period to 19.37% in 2010, attributed to the heavy reliance on infrastructure projects. However, this sector was affected by the stoppage or delays of some major projects.

The industrial sector, on the other hand, has seen a low employment rate that did not exceed 14% during the studied period, reflecting structural challenges such as weak industrial investment, which prevents the attraction of labor to this crucial sector despite its role in economic diversification.

II.3.3 Contributions of Economic Sectors to Foreign Trade:

The foreign trade sector is one of the most important strategic sectors for the national economy due to its crucial role in connecting Algeria with global markets. This sector significantly contributes to the flow of goods and services between Algeria and the outside world, serving as a vital indicator for measuring the level of economic openness and the effectiveness of trade policy.

To clarify the structure of Algeria's foreign trade, we present its main features by analyzing the development of both export and import values, as well as the trade balance for the period 2000-2023. Table (02) illustrates the evolution of these key indicators, reflecting the changes in the Algerian economy and the impact of global fluctuations and oil prices on foreign trade performance.

Table (02): Development of Foreign Trade in Algeria for the Period 2000-2023.

(Unit: Million US Dollars)

Years	Imports	Hydrocarbon Sector Imports	Imports Outside the Hydrocarbons Sector	Exports	Hydrocarbon Sector Exports	Exports Outside the Hydrocarbons Sector	Trade Balance
2000	9345	106	9239	21651	21061	590	12306
2001	9482	97	9385	19091	18531	560	9609
2002	12010	132	11878	18714	18109	605	6704
2003	13322	41	13281	24469	23993	476	11147
2004	17954	158	17796	32217	31550	667	14263
2005	19857	199	19658	46334	45588	746	26477
2006	20681	230	20451	54741	53608	1133	34060
2007	26348	305	26043	60590	59605	985	34242
2008	37993	560	37433	78590	77194	1396	40597
2009	37402	516	36886	45186	44415	771	7784
2010	38885	898	37987	57091	56121	970	18206
2011	46927	1094	45833	72888	71661	1227	25961
2012	51569	4659	46910	71736	70584	1152	20167
2013	54984	4139	50845	64713	63663	1050	9729
2014	59670	2720	56950	59996	58362	1634	326
2015	52649	2247	50402	34566	33081	1485	-18083
2016	49436	1234	48202	29310	27918	1392	-20126
2017	48076	1899	46177	34569	33202	1367	-13507
2018	48292	977	47315	41146	38929	2217	-7146
2019	44323	1369	42954	35323	33255	2068	-9000
2020	35421	890	34531	21932	20022	1910	-13489
2021	37405	513	36892	38637	34137	4500	1232
2022	38757	581	38176	65526	59711	5815	26769
2023	42842	616	42226	55555	50781	4774	12713

Source: Prepared by the researchers based on:

- DGPP, Ministry of Finance, Foreign Trade of Algeria 2000 - 2022, accessed on 07/10/2024, at https://dgpp.mf.gov.dz/commerce-exterieure/.
- Bank of Algeria, Statistical Bulletins, Quarterly Bulletin N° 65, 2023.

By reviewing the development of Algeria's foreign trade over the period 2000-2023, several key points emerge that reflect the performance of the Algerian economy:

1) ***Hydrocarbon Exports:*** It is evident that the hydrocarbon sector was the main driver of Algerian exports during most of the study period. Hydrocarbon exports peaked in 2008 at 77,194 billion dollars due to the global rise in oil prices. However, these exports declined significantly in subsequent years, especially after the oil price collapse in 2014, reaching 33,081 billion dollars in 2015. Despite an improvement in exports in 2021 and 2022, with values of 34,137 billion dollars and 59,711 billion dollars respectively, the dominance of the hydrocarbon sector remains apparent in the Algerian economy, highlighting a lack of income source

diversification.

2) ***Non-Hydrocarbon Exports:*** During the 2000-2023 period, Algeria's non-hydrocarbon exports showed noticeable fluctuations. At the beginning of the period, values were low, ranging from 476 million dollars in 2003 to 746 million dollars in 2005. In 2006, exports saw a slight improvement, exceeding the one-billion-dollar threshold, although the increase remained limited compared to hydrocarbon exports. However, exports experienced a significant jump in 2021 and 2022, reaching 4,5 billion dollars and 5,815 billion dollars, thanks to economic diversification efforts. Nevertheless, they declined again in 2023 to 4,774 billion dollars, which underscores the ongoing challenges in achieving sustained growth in non-hydrocarbon sectors.
3) ***Imports:*** Algerian imports underwent significant changes during the study period. Non-hydrocarbon goods and services imports rose from 9,239 billion dollars in 2000 to 56,95 billion dollars in 2014, reflecting Algeria's heavy reliance on imports to meet its needs. However, between 2015 and 2020, imports fell considerably due to Algeria's measures to rationalize public spending and maintain external balance by reducing dependence on imports. These measures were in response to economic challenges arising from the drop in oil prices and the impact of the COVID-19 pandemic on the global economy, which affected Algerian imports. Imports then rose again to 38,176 billion dollars in 2022 and 42,226 billion dollars in 2023. As for hydrocarbon imports, they saw notable fluctuations, rising from 106 million dollars in 2000 to 4,659 billion dollars in 2012, but then sharply declining to 2,247 billion dollars in 2015 due to the oil price collapse. They continued to fall, reaching 616 million dollars in 2023, reflecting global market impacts and government strategies to address economic challenges.
4) ***Trade Balance:*** The table shows significant fluctuations in Algeria's trade balance over the study period. Algeria recorded large trade surpluses during periods of high oil prices, such as in 2005 (26.477 billion dollars) and 2008 (40,597 billion dollars). However, after 2014, Algeria recorded a substantial trade deficit due to declining export revenues from the hydrocarbon sector and rising imports, with the deficit peaking at 20,126 billion dollars in 2016 and 13,489 billion dollars in 2020. In 2021 and 2022, however, the trade balance improved, as Algeria shifted from deficit to surplus, achieving a surplus of 26,769 billion dollars in 2022. This improvement was due to rising oil prices in global markets, which reactivated hydrocarbon exports.

These indicators demonstrate the dominance of the hydrocarbon sector in the Algerian economy and emphasize the need to take serious steps toward economic diversification and strengthen non-hydrocarbon sectors to achieve greater stability in foreign trade.

II.4 The Current State of Economic Diversification in Algeria:

Studying the current state of economic diversification in Algeria is essential to understand the degree of the national economy’s reliance on various economic sectors. This analysis relies on tables showing each sector's contribution to GDP, employment levels, and the percentage of exports each sector contributes. To accurately assess the

degree of economic diversification, the Herfindahl-Hirschman Index (H.H) can be used. This index measures the level of diversity in the national economy, and it is calculated using the following formula:

$$H.H = \frac{\sqrt{\sum_{i=1}^{N}\left(\frac{X_i}{X}\right)^2} - \sqrt{\frac{1}{N}}}{1 - \sqrt{\frac{1}{N}}}$$

Where: X_i: The Gross Domestic Product (GDP) of sector *i;* X: The total Gross Domestic Product (GDP); N: The number of components in the output (i.e., the number of sectors forming the structural composition under study).

The index takes a value of 0 when there is complete diversification in the economy, meaning all economic sectors contribute equally to economic growth. The index reaches a value of 1 when economic activity is fully concentrated in a single sector, indicating an absence of diversification (Dheif & Azouz, 2018, p. 23).

Based on this methodology and previous tables, the following table presents the values of the Herfindahl-Hirschman Index (H.H) for GDP, Employment (EM), and Exports (EX) in Algeria over the period 2000-2023:

Table (03): Values of the Herfindahl-Hirschman Index (H.H) in Algeria for the Period 2000-2023

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Value of H.H GDP	0,247	0,187	0,172	0,203	0,225	0,304	0,313	0,292	0,325	0,156	0,199	0,231
Value of H.H EM	0,325	0,222	0,224	0,201	0,213	0,198	0,242	0,24	0,235	0,225	0,265	0,325
Value of H.H EX	0,915	0,908	0,899	0,939	0,935	0,949	0,935	0,949	0,944	0,946	0,946	0,947
Years	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Value of H.H GDP	0,211	0,152	0,122	0,057	0,049	0,058	0,073	0,054	0,034	0,074	0,148	0,084
Value of H.H EM	0,313	0,286	0,31	0,313	0,307	0,277	0,305	0,301	-	-	-	-
Value of H.H EX	0,949	0,947	0,915	0,868	0,855	0,878	0,836	0,823	0,744	0,669	0,741	0,747

Source: Prepared by the researchers based on Appendices (01) and (02) and Table (02).

Based on the table, we observe that the values of the Herfindahl-Hirschman Index (H.H) for GDP in Algeria show significant fluctuations from 2000 to 2023. The values rose from 0,247 in 2000 to 0,325 in 2008, indicating a decrease in diversification during that period. Subsequently, the index saw a significant drop to 0,057 in 2015, reflecting the beginning of a shift towards diversifying sources of output away from reliance on the hydrocarbons sector, and this decline continued until 2020. However, the index rose again to reach 0,148 in 2022, suggesting a reduction in diversification and an increased reliance on a limited number of sectors, particularly the hydrocarbons sector.

As for the diversification index for employment, the values are also close to 0, indicating limited diversification in employment sources. However, these values remain insufficient to reflect the actual diversity in the labor market, where the sectors of commerce, services, and administration dominate job opportunities.

Regarding the values of the diversification index for exports, they approach 1, indicating a lack of diversity in the export structure, as the Algerian economy heavily relies on hydrocarbon exports, reflecting the nature of a mono-export economy.

Based on this analysis, it can be concluded that the Algerian economy suffers from a lack of diversification and is characterized as a mono-economy. Despite some slight improvements in certain years, these enhancements are not sufficient to effect a substantial change in the national economic structure.

III. Foresight for the Path of Economic Sectors in Algeria:

To establish a foresight and strategy for the trajectory of economic sector indicators in Algeria, a predictive study was conducted to determine the contribution percentage of various sectors to the value added of the Gross Domestic Product (GDP) in the coming years, within the framework of the 2030 prospects. This study relied on the application of the Holt-Winters exponential smoothing method using the Eviews program, which is one of the important statistical tools for forecasting future trends, contributing to providing accurate insights that assist in developing economic policies that ensure economic diversification and sustainable development.

III.1. Holt-Winters Exponential Smoothing Method:

Exponential smoothing is one of the commonly used techniques for forecasting time series, defined as a process of refining or smoothing data that contains noise. In addition to its high efficiency in delivering accurate results, exponential smoothing helps reduce the effects of missing values using traditional forecasting methods such as the Naïve method, which is known as random walk, simple arithmetic mean, and moving average (Ghzwan, 2010, p. 263).

There are several types of exponential smoothing, including simple exponential smoothing and double exponential smoothing. Simple exponential smoothing is suitable when the time series does not exhibit a trend or seasonality, providing a constant forecast. On the other hand, double exponential smoothing is distinguished by its ability to account for trends, making it more effective in tracking the time series when a trend is present, as it incorporates the trend into the forecasting process (Bouabdallah, p. 140).

As mentioned earlier, double exponential smoothing considers the trend but does not address seasonality. Therefore, Holt's student, Peter Winters (1960), improved this model by incorporating seasonality through a third factor, which later became known as Holt-Winters three-component smoothing, also referred to as "Winters smoothing" or "triple smoothing" (Bouabdallah, p. 155).

The Holt-Winters method provides accurate forecasting results due to its ability to handle data that exhibits seasonal fluctuations and clear trends. This method requires data from at least two seasons and relies on a model that consists of three main components: level estimation (l_t), trend estimation (T_t), and seasonal estimation (S_t) (Ruekkasaem & Sasananan, 2018, p. 961).

The Holt-Winters method has been designed to suit two types of time series that exhibit linear trends (Kumar, 2020/2021, p. 06):

- ***Multiplicative Holt-Winters Method:*** Used for time series that contain increasing seasonal fluctuations.
- ***Additive Holt-Winters Method:*** Used for time series that contain stable seasonal fluctuations.

III.1.1 Multiplicative Holt-Winters Method:

In the Holt-Winters multiplicative method, the forecast that follows the overall trend is combined with seasonal changes by multiplying them together. This makes this method the most suitable for handling data that contains a clear trend and increasing seasonal fluctuations over time. This method results in a forecast that takes a curved shape reflecting the seasonal changes in the data (F. Pleños, 2022, p. 20).

Typically, the equation for the Holt-Winters multiplicative model is expressed as follows (F. Pleños, 2022):

$$Y_t = T_t \times S_t \times \varepsilon_t$$

Where: $\boldsymbol{T_t}$: represents the trend; $\boldsymbol{S_t}$: the seasonality; $\boldsymbol{\varepsilon_t}$: the error term.

The forecasting relies on the following three equations (Bouabdallah, p. 143):

- ***Level Equation :***

$$l_t = \alpha\left(\mathrm{Y_t}/S_{t-p}\right) + (1-\alpha)(l_{t-1} + T_{t-1}) \qquad 0 \le \alpha \le 1$$

- ***Trend Equation :***

$$T_t = \beta(l_{t-1} + l_{t-1}) + (1-\beta)T_{t-1} \qquad 0 \le \beta \le 1$$

- ***Seasonality Equation:***

$$S_t = \gamma(\mathrm{Y_t}/l_t) + (1-\gamma)S_{t-p} \qquad 0 \le \gamma \le 1$$

- ***Forecast Equation:***

$$\hat{\mathrm{y}}_\mathrm{t}(h) = (l_t + hT_t) \times S_{t+h-p}$$

Where: $\boldsymbol{l_t}$: represents the level at time *t*; $\boldsymbol{T_t}$: the trend at time *t*; $\boldsymbol{S_t}$: the seasonality at time *t*; $\boldsymbol{p}$: the seasonal window (length of the seasonal cycle); $\boldsymbol{h}$: the forecasting horizon ; $\boldsymbol{\alpha}$ ،$\boldsymbol{\beta}$ **and** $\boldsymbol{\gamma}$: the smoothing coefficients for level, trend, and seasonality, respectively.

After smoothing, it becomes essential to evaluate and improve the model to ensure the quality of the forecasts. Evaluation can be conducted using several methods, including graphical representation that displays the time series along with the smoothed and forecasted values, and analyzing the error component through its graphical representation. It is preferred that the errors are random, meaning they are free of patterns. Additionally, accuracy indicators such as the Mean Squared Error (MSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE) can be calculated to assess the model's performance (Bouabdallah, p. 144).

III.1.2 Additive Holt-Winters Method:

In the additive Holt-Winters method, the seasonal pattern of the series remains constant, meaning that the seasonal fluctuations in the data remain approximately at

the same level over time and do not vary in relation to the overall data. This method is most suitable for data that exhibit a trend with seasonal fluctuations that do not increase over time (F. Pleños, 2022, p. 20).

The equation for the additive Holt-Winters model is expressed as follows (F. Pleños, 2022, p. 20):

$$Y_t = T_t + S_t + \varepsilon_t$$

Where: $\boldsymbol{T_t}$: represents the trend; $\boldsymbol{S_t}$: the seasonality; $\boldsymbol{\varepsilon_t}$: the error term.

The forecasting relies on the following three equations (Bouabdallah, p. 148):

- ***Level Equation :***

$$l_t = \alpha(\mathrm{Y_t} - S_{t-p}) + (1-\alpha)(l_{t-1} + T_{t-1}) \qquad 0 \le \alpha \le 1$$

- ***Trend Equation :***

$$T_t = \beta(l_{t-1} - l_{t-1}) + (1-\beta)T_{t-1} \qquad 0 \le \beta \le 1$$

- ***Seasonality Equation:***

$$S_t = \gamma(\mathrm{Y_t} - l_t) + (1-\gamma)S_{t-p} \qquad 0 \le \gamma \le 1$$

- ***Forecast Equation:***

$$\hat{\mathrm{y}}_\mathrm{t}(h) = (l_t + hT_t) + S_{t+h-p}$$

As with the multiplicative model, the smoothing and forecasting are evaluated using visual tools, such as a graph, along with estimation indicators. If necessary, the model can be improved by adjusting the parameters of its various components to minimize the estimation indicators' values. This manual adjustment process can be computationally intensive; fortunately, many specialized statistical software programs automatically select the best smoothing parameters for the three components (level, trend, and seasonality) to minimize these indicators (Bouabdallah, p. 149).

The optimal exponential smoothing method can also be chosen by comparing two main indicators: the Sum of Squared Residuals (SSR) and the Root Mean Square Error (RMSE). The method that yields the lowest values for these indicators can be selected using Eviews software estimation results (Ben Ghana).

III.2. Forecasting the Path of Algerian Economic Sectors:

To select the most suitable exponential smoothing method for forecasting the path of Algeria's economic sector indicators, we collected the estimated smoothing functions for each sector using Eviews, presented in the following table:

Table (04): Results of Estimating Smoothing Functions for Each Sector.

Variables	Simple Exponential Smoothing	Double Exponential Smoothing	Holt-Winters Exponential Smoothing
Hydrocarbons Sector Variable	SSR= 828,17	SSR= 982,06	SSR= 818,90
	RMSE= 5,87	RMSE= 6,39	RMSE= 5,84
Agriculture Sector Variable	SSR= 63,31	SSR= 67,90	SSR= 61,23
	RMSE= 1,62	RMSE= 1,68	RMSE= 1,59

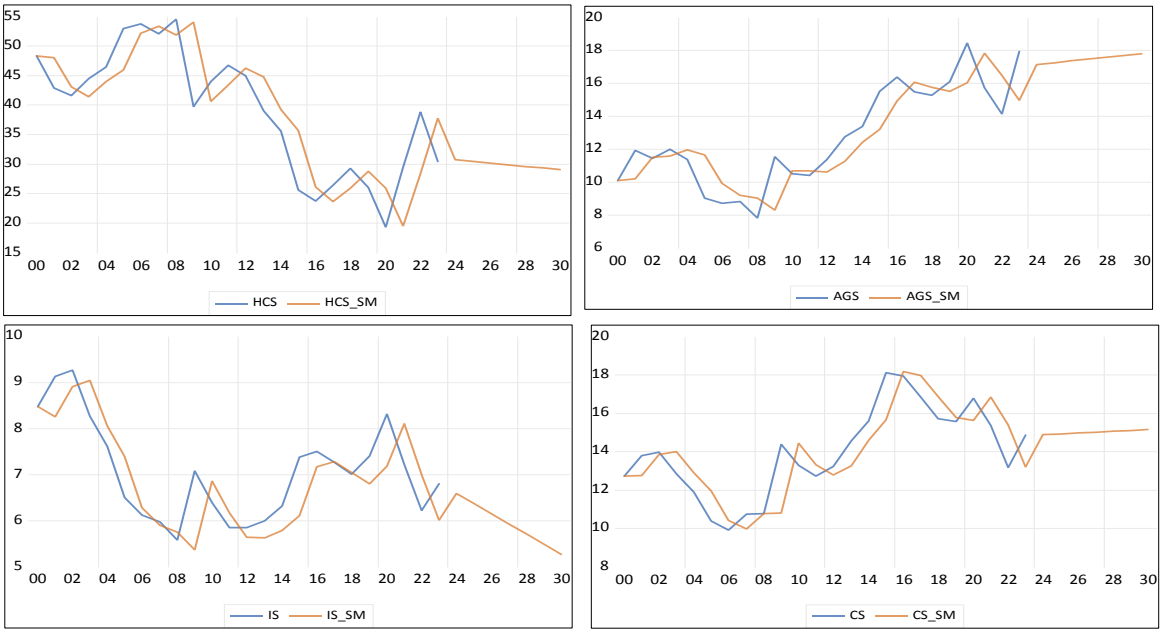
Industry Sector Variable	SSR= 13,02	SSR= 14,30	SSR= 11,74
	RMSE= 0,73	RMSE= 0,77	RMSE= 0,69
Commerce Sector Variable	SSR=44,57	SSR= 57,47	SSR= 44,24
	RMSE= 1,36	RMSE= 1,54	RMSE= 1,35
Services Sector Variable	SSR= 3,60	SSR= 4,40	SSR= 3,60
	RMSE= 0,38	RMSE= 0,42	RMSE= 0,38
Construction and Public Works Sector Variable	SSR= 34,61	SSR= 41,77	SSR= 31,80
	RMSE=1,20	RMSE= 1,31	RMSE= 1,15
Transport and Communication Sector Variable	SSR= 29,27	SSR= 31,74	SSR= 26,85
	RMSE= 1,10	RMSE= 1,15	RMSE= 1,05

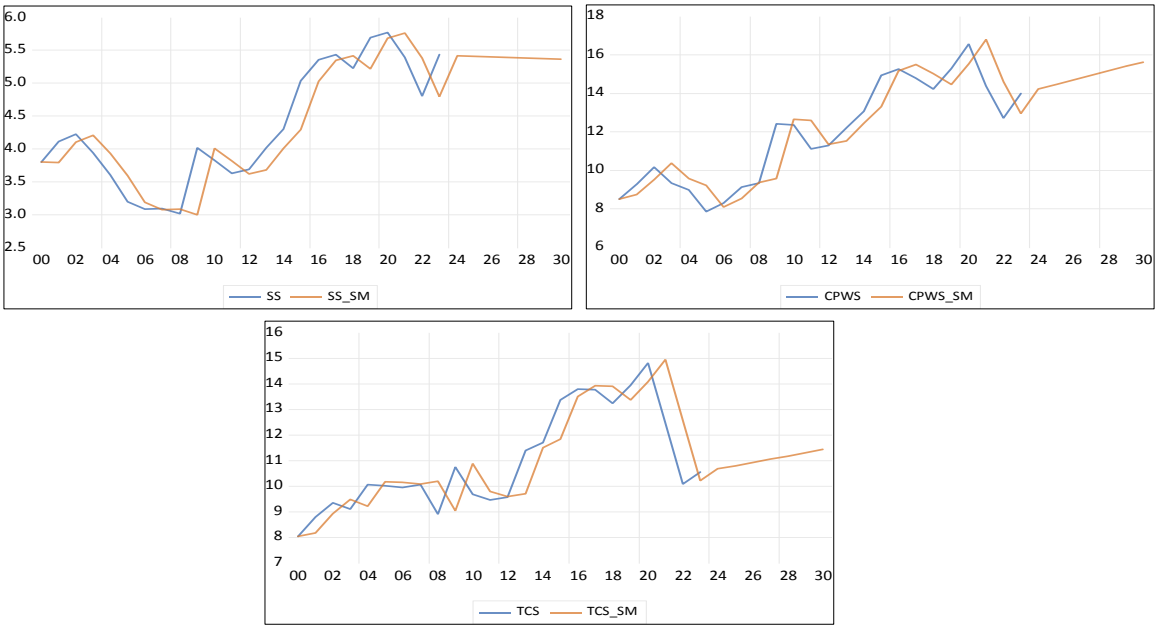
Source: Prepared by the researchers based on data from Appendix No. 01 and the Eviews program.

From the estimation results table, it is clear that the most suitable method for forecasting is the Holt-Winters method for models without seasonality. This choice is due to the absence of a seasonal component in our study series, which only exhibit a general trend component. The Holt-Winters method showed the lowest values for the two indicators compared to the other two methods (simple exponential smoothing and double exponential smoothing).

When applying the Holt-Winters exponential smoothing method to the contribution rates of sectors in forming the added value of the Gross Domestic Product (GDP) over the coming years, the results were as follows:

Fig. (06): Graphical representation of the series and smoothing functions for the next 10 years.





Source: Prepared by the researchers using the Eviews program.

From the graphical representations, we observe that the graphical depiction of the economic sectors' series and the predictive smoothing functions using the Holt-Winters method align closely, allowing for reliance on them in forecasting processes. It is evident that the non-hydrocarbon sectors will experience continuous growth over the next seven years, except for the services and industrial sectors, which are expected to see a decline in their contribution values. At the same time, the hydrocarbon sector exhibits a continuous downward trend, which the government aims to achieve through the new growth model.

The following table presents the forecasted values for the contribution rates of economic sectors to the added value of the Gross Domestic Product (GDP) during the period from 2024 to 2030:

Table (05): Forecasted values for the contribution rates of sectors to GDP during the period 2024-2030.

DATE	HCS_SM	AGS_SM	IS_SM	CS_SM	SS_SM	CPWS_SM	TCS_SM
2024	30,73	17,16	6,58	14,89	5,42	14,23	10,67
2025	30,45	17,27	6,36	14,93	5,41	14,47	10,8
2026	30,17	17,38	6,14	14,98	5,4	14,7	10,92
2027	29,89	17,49	5,92	15,02	5,39	14,93	11,05
2028	29,61	17,59	5,7	15,06	5,38	15,16	11,18
2029	29,33	17,7	5,489	15,1	5,38	15,4	11,31
2030	29,05	17,81	5,27	15,14	5,37	15,63	11,43

Source: Prepared by the researchers using the Eviews program.

The forecasts indicate a continuous decline in the contribution of the hydrocarbon sector to Algeria's economy, projected to drop to 29,05% by 2030. This reflects the country's efforts to diversify its economy and reduce its dependence on oil. Conversely, steady growth is expected in other sectors, such as agriculture and construction, with the agricultural sector projected to contribute 17,81% to the GDP by 2030. However, the industry and services sectors are anticipated to see a decrease in

their contributions, potentially due to challenges in technological development and investment. This analysis underscores Algeria's shift toward sustainable economic growth, though some sectors still require greater support to meet their development goals.

V. Conclusion:

The economic diversification policy is a significant strategic step for Algeria towards enhancing sustainable economic growth and reducing dependency on the hydrocarbons sector. Analysis of economic indicators reveals a noticeable weakness in the performance of non-oil sectors, despite some limited signs of a shift towards economic diversification. However, if the government effectively implements the new growth model, improvements in the diversification of the national economy can be expected by 2030. In this regard, the main findings can be summarized as follows:

- The primary sectors in the economy contribute unevenly, with the largest share of value added to the GDP concentrated in the hydrocarbons sector at an average of 39.02%, followed by the trade sector at 13.96%. Other sectors remain weak, with agriculture contributing 12.76%, construction and public works 11.89%, and transport and communications 10.94%, while the industry and services sectors contribute 7.06% and 4.32%, respectively, during the period 2000-2023.
- The distribution of the labor force in Algeria is mainly focused on the trade, services, and administrative sectors, which collectively account for more than 60% of the workforce from 2000 to 2019.
- Algeria's trade balance deficit in recent years reflects a heavy reliance on the hydrocarbons sector, as hydrocarbons exports account for 97% of total exports. This dependency on a single product, particularly amidst declining prices, weakens the Algerian economy and hinders its ability to diversify exports, thus contributing to the trade balance deficit.
- The diversification index is closely tied to the hydrocarbons sector, resulting in a weak interpretation of economic diversification in Algeria and a failure to achieve the desired objectives.
- The likelihood of success for the new growth model, if the government ensures its implementation, suggests that the contribution of the hydrocarbons sector to GDP value added may decrease to 29.05% by 2030, while most other sectors are expected to increase their contributions, reflecting the economic diversification efforts.

Based on these findings, it is evident that economic diversification represents a vital and necessary pathway for Algeria to achieve sustainable development and enhance the competitiveness of the national economy. This will require effective strategies and cooperation between various sectors to accomplish the intended goals.

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Appendix No. 01: Contribution rates of economic sectors to the formation of Gross Domestic Product for the period 2000-2023.

Years	Services	Commerce	Transport and Communication	Construction and Public Works	Industry	Agriculture	Hydrocarbons
2000	3,8	12,72	8,04	8,51	8,47	10,09	48,36
2001	4,11	13,8	8,8	9,28	9,13	11,94	42,94
2002	4,22	13,97	9,35	10,15	9,26	11,44	41,61
2003	3,94	12,85	9,09	9,33	8,27	11,99	44,52
2004	3,6	11,9	10,05	8,99	7,61	11,38	46,46
2005	3,2	10,38	10,02	7,85	6,5	9,04	53,01
2006	3,08	9,92	9,94	8,31	6,12	8,73	53,73
2007	3,09	10,74	10,06	9,12	5,97	8,81	52,04
2008	3,01	10,77	8,91	9,34	5,58	7,81	54,58
2009	4,02	14,4	10,74	12,42	7,08	11,56	39,78
2010	3,83	13,29	9,67	12,37	6,39	10,51	43,945
2011	3,63	12,74	9,46	11,12	5,85	10,42	46,79
2012	3,69	13,22	9,57	11,3	5,84	11,39	44,99
2013	4,02	14,55	11,38	12,21	6	12,76	39,09
2014	4,3	15,61	11,7	13,06	6,32	13,38	35,64
2015	5,04	18,13	13,37	14,93	7,38	15,53	25,62
2016	5,36	17,93	13,79	15,27	7,5	16,39	23,78
2017	5,43	16,84	13,77	14,78	7,26	15,49	26,43
2018	5,23	15,73	13,23	14,22	7,01	15,28	29,29
2019	5,69	15,58	13,94	15,29	7,4	16,12	26
2020	5,77	16,8	14,82	16,56	8,32	18,46	19,26
2021	5,39	15,35	12,45	14,38	7,21	15,74	29,48
2022	4,8	13,17	10,08	12,71	6,22	14,15	38,87
2023	5,43	14,85	10,54	14	6,8	17,95	30,43
Average period	**4,32**	**13,9683333**	**10,94875**	**11,89583333**	**7,06208333**	**12,765**	**39,026875**

Source: Prepared by the researchers based on data from the National Statistics Office:

- Retrospective of economic accounts from 1963 to 2021, pp 62-64.
- Economic Accounts from 2021 to 2023, p 27.

Appendix No. 02: Distribution of Employment by Economic Sectors in Algeria for the Period 2000-2019.

Years	Commerce, Services, and Administration	Construction and Public Works	Industry	Agriculture	the total
2000	62,52	9,99	13,37	14,12	**100**
2001	54,68	10,44	13,82	21,06	**100**
2003	54,87	11,97	12,03	21,13	**100**
2004	53,25	12,41	13,6	20,74	**100**
2005	54,61	15,07	13,16	17,16	**100**
2006	53,42	14,18	14,25	18,15	**100**
2007	56,69	17,73	11,96	13,62	**100**
2008	56,61	17,22	12,48	13,69	**100**
2009	56,14	18,14	12,61	13,11	**100**
2010	55,23	19,37	13,73	11,67	**100**
2011	58,37	16,62	14,24	10,77	**100**
2012	61,6	16,3	13,1	9	**100**
2013	59,8	16,6	13	10,6	**100**
2014	61,4	16,5	12,6	9,5	**100**
2015	61,5	16,8	13	8,7	**100**
2016	61	17,5	13,5	8	**100**

2017	59,1	17	13,8	10,1	**100**
2018	61,1	16,1	13,1	9,7	**100**
2019	60,79	16,76	12,85	9,6	**100**

Source: National Office of Statistics, Statistical Retrospective 1962 – 2020, Chapter -II- Employment.