

THE IMPACT OF NON-OIL EXPORTS ON SUSTAINABLE DEVELOPMENT IN ALGERIA: AN EMPIRICAL STUDY DURING THE PERIOD (1990-2022)

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Send Article Date: 19 - 09 -2024 Date of acceptance of the article: 01 - 01 -2025

Abstract:

This research paper aims to measure the impact of non-oil exports on achieving sustainable development in Algeria during the period 1990/2022. In order to achieve the study objectives, the standard model was used using least squares models. As for the study data, it was obtained from the World Bank Group for Statistics 2024. The study found a strong direct relationship between exports and economic development in Algeria. Despite the efforts made to promote non-oil exports, their outcome is still small due to reliance on oil as a major source of exports. Therefore, more effective strategies must be adopted to promote non-oil exports to achieve sustainable development in Algeria.

key words: Non-oil exports, sustainable development, gross domestic product.

Introduction:

In the contemporary era, the pursuit of sustainable development is a universal objective, responding to the escalating economic, social, and environmental complexities faced by all nations. Sustainable development transcends mere economic advancement, encompassing environmental and social dimensions crucial for enhancing the well-

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being of present and future generations. For countries like Algeria, heavily reliant on natural resources, notably oil, non-oil exports emerge as a pivotal driver towards achieving sustainable development goals.

Algeria's historical dependence on the oil and gas sector as a primary source of national income and government revenue has rendered the economy susceptible to significant fluctuations due to volatile oil prices in global markets, emphasizing the imperative of economic diversification. In response, the Algerian government has initiated strategic measures to bolster non-oil exports, spanning diverse sectors such as agriculture, light industries, raw materials, and services. While the scale of these exports currently pales in comparison to the oil sector, their substantial growth potential holds the key to diminishing reliance on oil. The development of non-oil sectors not only creates employment opportunities and attracts investments but also enhances Algeria's competitiveness on the global stage.

A fundamental challenge encountered in Algeria's development trajectory is striking a harmonious balance between economic growth and sustainable utilization of natural resources. Failure to integrate economic diversification and environmental sustainability could lead to resource depletion and environmental degradation, adversely impacting future generations. Consequently, investigating the influence of non-oil exports on sustainable development in Algeria during the period from 1990 to 2022 is paramount, given the country's predominant reliance on oil exports and vulnerability to external shocks stemming from oil price fluctuations. By studying this topic, we seek to provide a vision on the role that non-oil exports play in promoting sustainable development. We seek to answer the following question: **Do non-oil exports have a positive impact on sustainable development in Algeria?**

This study explores the relationship between non-oil exports and sustainable development in Algeria, highlighting their potential to promote growth in an economy heavily reliant on oil revenues. By analyzing economic data from a specific period, the research aims to provide insights and policy recommendations that support non-oil

export growth while addressing economic, social, and environmental aspects of sustainability.

Significantly, this research addresses a gap in the literature by focusing on non-oil exports, as most analyses concentrate on oil. Given Algeria's economic challenges from its dependence on oil and gas, the study investigates how non-oil exports can diversify income sources, create job opportunities, increase government revenues, and foster innovation in sectors like agriculture, manufacturing, and technology.

Ultimately, the study offers practical recommendations for policymakers to enhance non-oil exports as a strategic approach to sustainable development, aiming to reduce Algeria's economic vulnerabilities linked to global oil market fluctuations.

SECTION I: THEORETICAL FRAMWORK

Sustainable development is a fundamental pillar to ensure the well-being of present and future generations, balancing economic, social and environmental dimensions. In this context, the importance of non-oil exports is highlighted as a means of diversifying the economy and reducing dependence on oil. These exports foster innovation and create jobs, contributing to sustainable development.

First Requirement: Conceptual Framework Related to Non-Oil Exports and Sustainable Development

- **Sustainable Development: Concept and Dimensions**

Sustainable development, as defined by Brundtland in 1987, refers to development that satisfies current needs without jeopardizing future generations' ability to meet their own needs. This concept revolves around striking a harmonious equilibrium among economic advancement, social equity, and environmental preservation. These three fundamental dimensions are interconnected and essential for achieving sustainable development.

Economic Dimension: Aims to achieve economic growth that continues over the long term without depleting natural resources. In

this context, sustainable growth requires investments in human and technological capital, and attention to renewable and diversified economic sectors (Todaro & Smith, 2011).

Social Dimension: Refers to improving the level of social welfare by providing educational and health opportunities for all citizens, while reducing economic and social gaps between different groups. The social dimension requires ensuring equal opportunities in access to resources and economic benefits (Sen, 1999).

Environmental dimension: It is related to protecting natural resources and the environment from deterioration, as economic activities must be compatible with preserving the environment by reducing pollution and consuming resources in a sustainable manner (Pearce & al., 1989)

In Algeria, sustainable development is a strategic goal, especially in light of the environmental challenges facing the country such as desertification and water scarcity. The Algerian government has developed plans to achieve comprehensive development that takes into account the three dimensions, but the main challenge lies in how to achieve this goal while continuing to rely heavily on the oil sector.

▪ **Non-oil exports:**

Definition and importance: Non-oil exports in Algeria encompass all goods and services exported by the country except for oil and gas. These exports are crucial for reducing reliance on oil revenues, which currently form a significant portion of government income. Algerian non-oil exports include agricultural products, food industries, textiles, and mineral products. The significance of non-oil exports lies in their ability to diversify the national economy and enhance competitiveness. Previous research (Herzer et al., 2006) suggests that diversifying non-oil exports can improve the trade balance and decrease dependency on volatile natural resources. Shifting towards non-oil exports in Algeria can lead to job creation and foster innovation in the industrial sector, thereby supporting sustainable economic growth.

Furthermore, non-oil exports play a key role in boosting the local economy by attracting investments in non-traditional sectors. Enhancing the business environment and implementing export-

friendly policies are integral parts of the national strategy to diversify the economy. Developing sectors like agriculture and technology can also aid in achieving a more balanced economy less reliant on oil revenues (Benmehaia&Brabez, 2019).

Second Requirement: The relationship between non-oil exports and sustainable development

Non-oil exports play a significant role in promoting sustainable development by diversifying income sources, fostering economic growth, and encouraging innovation. Unlike oil industries that often lead to pollution and resource depletion, non-oil sectors are generally more environmentally sustainable (UNCTAD, 2014).

In the Algerian context, research indicates a positive correlation between increased non-oil exports and sustainable development. Economic studies suggest that nations diversifying their exports tend to achieve more sustainable and inclusive growth, as non-oil sectors create employment opportunities, drive innovation, and support local development (Sachs, 2000). Furthermore, boosting non-oil exports helps mitigate economic risks associated with fluctuations in oil prices, thereby enhancing macroeconomic stability.

Realizing the full potential of non-oil exports in Algeria necessitates robust government policies that facilitate improvements in the business environment and infrastructure development. Economic diversification also hinges on investments in education and technology to bolster the competitiveness of non-oil sectors (Benhaddadi, 2020).

As highlighted in a study by Benmehaia and Brabez (2019), the development of sectors like agriculture and manufacturing can significantly enhance Algeria's prospects for sustainable development. However, overcoming regulatory and financial challenges that these sectors face is crucial for success.

▪ Challenges and opportunities for non-oil exports in Algeria

Algeria faces obstacles in developing its non-oil exports, including inadequate infrastructure, bureaucratic hurdles, and limited

competitiveness in certain sectors. These challenges impede Algerian exporters from competing effectively in global markets, particularly concerning issues of quality and operational efficiency (Gherbi, 2015).

Yet, recent economic reforms in Algeria present opportunities to bolster non-oil exports. By enhancing industrial infrastructure and embracing new technologies, the nation can boost the efficiency of non-oil sectors, thus contributing to long-term sustainable development. Strengthening trade relations at regional and international levels could also aid in expanding export opportunities for Algerian goods, thereby increasing the prospects for sustainable economic growth (World Bank, 2021).

SECTION II: REVIEW OF THEORETICAL AND APPLIED LITERATURE

The relationship between sustainable development and non-oil exports is a central theme in the economic literature, highlighting the role of exports in promoting sustainable economic growth. Previous studies examine how non-oil exports can contribute to the diversification of the economy, reducing dependence on oil and promoting economic stability. In this part of the research, we will try to shed light on the most important literature that dealt with this relationship.

First Requirement: Theories related to non-oil exports and sustainable development

Export-Led Growth Theory: Export-Led Growth Theory emphasizes the role of international trade in driving economic growth through increased aggregate demand, domestic production, and productivity enhancement. In the case of Algeria, leveraging non-oil exports presents an opportunity for economic diversification, expanding market access, and reducing reliance on the volatile oil and gas sector.

This theory underscores that expanding exports enables the accumulation of domestic capital, allowing exporters to reinvest revenues into business expansion and technological advancements (Herzer et al., 2006). Concerning sustainable development, non-oil exports are crucial in generating financial resources to support social

and environmental initiatives, promoting a balanced approach between economic growth and sustainability.

Sustainable Development Theory: The theory of sustainable development underscores the importance of balancing economic, social, and environmental dimensions of growth to ensure responsible resource utilization and preserve the well-being of future generations. It emphasizes the need for diversifying income sources and reducing reliance on finite resources like oil. Non-oil exports play a crucial role in advancing sustainable development by providing a stable economic alternative to volatile oil reserves (Todaro & Smith, 2011). By promoting non-oil sectors, the economy can mitigate environmental impacts associated with extractive industries, create new economic opportunities, promote social equity through job creation, and improve infrastructure development in both rural and urban areas.

Theory of Comparative Advantage: The comparative advantage theory by economist David Ricardo, a cornerstone in international trade, suggests that countries should specialize in producing goods where they excel compared to others. They should export these goods and import items that other countries produce more efficiently. For Algeria, non-oil exports, such as agriculture or manufacturing, could be a specialized area where the country may have a comparative advantage due to resource availability or cost-effective labor.

Non-oil exports offer a strategic opportunity to utilize local resources in environmentally sustainable ways, diverging from the practices of the oil industry. By focusing on developing non-oil sectors where Algeria has a comparative advantage, sustainable economic growth can be achieved without relying solely on oil (Sachs, 2000).

Resource Dependence Theory: The theory of the "resource curse" or "Dutch disease" underscores the risks linked to relying solely on a single resource for economic progress. This theory highlights that heavy dependence on natural resources like oil can result in significant economic instabilities due to global price fluctuations, rendering the economy susceptible to external disruptions. To address this challenge, diversifying income sources

through non-oil sector development is crucial (Gylfason, 2001). In the context of Algeria, experts advocate for promoting non-oil exports to mitigate economic volatility and advance a more inclusive form of sustainable development.

second Requirement: Theories related to the standard models that studied the relationship between non-oil exports and sustainable development

_Robert Solow's Neoclassical Growth Model (1956): Robert Solow introduced the neoclassical growth model, also known as the Solow-Swan Growth Model, in 1956. This model delves into the connection between economic growth and factors like capital, labor, and technology, making it a pivotal theory in elucidating long-term growth patterns. Solow posited that economic growth hinges on the buildup of physical and human capital, with technological advancement emerging as the primary growth catalyst in the long haul. According to Solow, investing in capital and technology can enhance productivity, yet the impact wanes over time without sustained technological progress.

_Ram's theory (1985): Ram (1985) studied the relationship between exports and economic growth using econometric models based on time data. He found that exports have a positive effect on economic growth, but this effect depends on the composition of the export structure. While Ram focused on the macroeconomy, he opened the way for subsequent studies to analyze the impact of non-oil sectors in particular.

_Grossman and Helpman (1991): Grossman and Helpman (1991) presented a theoretical model for integrating international trade and sustainable development into a standard framework, showing how international trade, including non-oil exports, can lead to improvements in environmental and economic sustainability. Their study is considered a reference in linking economic growth to sustainable development

In our study, we relied on the following two theories: Robert Solow (1956) and Greg Mankiw (1973), and how they relate to standard

models, especially in the context of the relationship between non-oil exports and sustainable development.

_Shin (1998): Shin (1998) used a multivariate econometric model to analyze the relationship between exports and economic growth in developing countries, indicating that increased non-oil exports were directly related to improvements in economic development and long-term sustainability.

_Herzer et al., 2006 : Herzer et al. (2006) presented an econometric study on the relationship between exports and economic growth in Chile using the ordinary least squares (OLS) model. They focused on analyzing the role of the composition of non-oil exports in enhancing productivity and growth. This study was one of the first studies to use an econometric model to assess the structural impact of non-oil exports on economic growth

- **Relationship to non-oil exports:** While the Solow model primarily emphasizes capital and labor, non-oil exports can indeed intersect with this framework. Expanding non-oil exports can result in a surge of foreign currency inflow, bolstering the economy's capacity to acquire advanced technology and fostering sustainable growth. Furthermore, investing in non-oil sectors can fuel the growth of productive capital, thereby bolstering economic sustainability within the Solow model.

_Gregory Mankiw's theory (Mankiw, Romer, & Weil, 1992): In 1992, Greg Mankiw, Romer, and Weil introduced the "MRW" model as a modification of the Solow model, incorporating human capital into the neoclassical framework. This model underscores the significance of human capital, encompassing education and training, in propelling economic growth alongside physical capital. It posits that nations investing in human capital are poised to achieve accelerated and more sustainable growth rates. This addition to the Solow theory underscores the vital role of skills development and education in enhancing long-term productivity.

- **Relationship to non-oil exports:** In the realm of non-oil exports and sustainable development, the theory elucidates how export diversification can spur investments in human capital. Venturing into

non-oil sectors like technology or manufacturing can incentivize governments to prioritize education and training, enhancing labor efficiency and driving sustainable economic growth.

- **Application of econometric models:** Solow and Mankiw's economic theories were constructed using econometric models to scrutinize economic data and predict growth patterns. These models play a critical role in evaluating the direct influence of non-oil exports on sustainable development by quantifying key variables like capital, technology, and human capital.

The Ordinary Least Squares (OLS) model stands out as a prevalent econometric tool for examining the correlation between non-oil exports and economic advancement. It aids in analyzing temporal data and comprehending the effects of various factors on development.

Solow and Mankiw's theories offer a robust theoretical foundation for comprehending the pathways to achieving sustainable economic growth. In the Algerian context, these theories can be leveraged to construct econometric models that gauge the impact of non-oil exports on sustainable development, with a specific focus on human capital and technology as pivotal components of long-term progress.

Third Requirement: Previous studies on the impact of non-oil exports on development

- **Ramadan & Al-Bahloul (2011)** presented a study on the impact of non-oil exports on economic growth and sustainable development in the Gulf countries. The study used data for the period from 1980 to 2008, and applied multiple regression models to analyze the relationship between non-oil exports and economic growth. The results indicated that increasing non-oil exports contributes to achieving economic stability and sustainable development.

- **Yousef & Abdullah (2013)** studied the impact of non-oil exports on economic development in Malaysia. The study relied on data extending from 1980 to 2010, and used different economic models such as the Autoregressive Distributed Lag (ARDL) model. The results showed that non-oil exports have a positive impact on

economic growth in Malaysia, especially in the industrial and agricultural sectors, which enhances economic sustainability.

- **Firat& Kara (2017)**In a study conducted by Firat and Kara (2017), the impact of non-oil exports on economic growth in Turkey was analyzed using time data from 1990 to 2015. The study used a VAR model to analyze the dynamic effects between non-oil exports and economic growth. The results showed that increasing non-oil exports in Turkey was associated with improving economic growth rates, which enhances economic sustainability. –

- **Al-Tayeb & Al-Mousawi (2015)** studied the impact of non-oil exports on economic growth and sustainable development in Middle Eastern countries. The study used data on non-oil exports and economic productivity for the period from 1990 to 2012. The results confirmed that export diversification contributes to improving economic growth and reducing dependence on oil, which enhances the opportunities for achieving sustainable development.

- **World Bank Study (World Bank, 2020)** In a report issued by the World Bank (2020), the impact of non-oil exports on sustainable development in developing countries, including Algeria, was analyzed. The report indicated that enhancing non-oil exports can contribute to achieving sustainable development by improving productivity and creating new job opportunities in non-oil sectors. The study highlighted the importance of developing infrastructure and technology to support this transformation.

▪ **Relationship of previous studies to the topic of our research**

_Lack of studies directed at non-oil exports and sustainable development: Most economic research in Algeria focuses on the oil sector. Therefore, there is a need for studies that focus on the impact of non-oil exports and determine their actual role in promoting sustainable development in the long term.

_Variation in the application of standard models: Some previous research has focused on using traditional economic models, but in our research, we will use standard tools, such as linear regression analysis with least squares. There is a gap in the application of these models to

analyze the relationship between non-oil exports and sustainable development

_The impact of emerging factors: The impact of some emerging economic factors such as changes in global trade policies, the impact of international economic crises, and changes in the local economic environment on non-oil exports and sustainable development has not yet been studied. This is what we did in the analysis of variables in the next step

_Time period: Many previous studies have been limited to short periods of time, which may lead to inaccurate results. The period from 1990 to 2022 provides a wide scope for analyzing the impact of non-oil exports in the context of major economic transformations in Algeria.

_Causality: There is a lack of research that adequately explores the causal relationship between non-oil exports and sustainable development. In our study, using advanced economic methods, these gaps were explored, which could help provide new additions.

SECTION III: METHODOLOGY OF THE STUDY

The objectives of this study are to analyze the relationship between non-oil exports and sustainable development in Algeria during the period from 1990 to 2023. A standard analysis methodology will be used that includes least squares (OLS) models to test the relationship and the effects of non-oil exports on sustainable development

First Requirement: Study variables

According to economic theories as well as previous studies that addressed the topic of our research and based on the statistics provided by ONS and the Longitudinal Bank, the proposed model relied on the following variables to explain the extent of the impact of non-oil exports on achieving the sustainable development goals 1990-2023:

**The impact of non-oil exports on sustainable development in Algeria: an
empirical study during the period (1990-2022)**

Table (01): Non-oil export revenue data

Years	GDP growth % (annual)	Gross capital fixed formation (% of GDP	Exports goods services of and (% of (GDP	Total national expenditure (%) (of GDP
1990	0,80	26,97	23,44	101,49
1991	-1,20	25,86	29,12	94,48
1992	1,80	27,07	25,32	98,55
1993	-2,10	27,01	21,78	101,36
1994	-0,90	28,40	22,53	103,52
1995	3,80	29,14	26,19	102,80
1996	4,10	24,88	29,76	94,18
1997	1,10	22,95	30,91	90,43
1998	5,10	25,75	22,58	99,94
1999	3,20	24,39	28,15	94,63
2000	3,80	20,68	42,07	78,72
2001	3,00	22,84	36,69	85,33
2002	5,60	24,57	35,50	90,13
2003	7,20	24,09	38,25	85,63
2004	4,30	24,02	40,05	85,59
2005	5,90	22,37	47,21	76,87
2006	1,70	23,17	48,81	73,11
2007	3,40	26,32	47,07	77,80
2008	2,40	29,23	47,97	80,74
2009	1,60	38,24	35,37	100,58
2010	3,60	36,28	38,44	92,98
2011	2,90	31,67	38,79	89,90
2012	3,40	30,80	36,89	91,62
2013	2,80	34,18	33,21	97,20
2014	3,80	36,82	30,49	101,52
2015	3,70	42,26	23,17	113,35
2016	3,20	43,07	20,87	114,18
2017	1,30	40,78	22,63	110,06
2018	1,20	40,26	25,86	106,34

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2019	1,00	38,38	22,71	106,38
2020	-5,10	38,44	17,47	110,39
2021	3,40	34,86	26,73	99,73
2022	3,20	29,80	35,34	88,37

Source: Based on World Bank statistics

Total national government spending DEPP: Government expenditures aimed at enhancing public welfare and fostering local development in Algeria encompass investments in infrastructure such as roads, factories, and overall infrastructure development. National government spending plays a pivotal role in bolstering the economy and advancing sustainable development objectives. The analysis will focus on examining the evolution of total national expenditure over the period from 1990 to 2022.

- **Public spending fluctuations in Algeria (1990-2021)** : Public spending in Algeria witnessed significant fluctuations during the period from 1990 to 2021, showing a discrepancy between periods of increase and decrease, as a result of the economic and political changes and structural reforms that the country witnessed.

- **Stabilization and structural adjustment period (1990-1998)** :During the stabilization agreements (1990-1994) and the expanded structural adjustment program (1994-1998) in Algeria, public spending exhibited notable fluctuations. It surged from 94% of GDP in 1991 to 103% in 1994, followed by a decrease to 90% in 1996 due to structural reforms targeting expenditure reduction. The uptick in state revenues induced by escalating oil prices facilitated reform implementation and the establishment of a social safety net for vulnerable segments of society. Throughout the structural adjustment phase, government spending showed a relative plateau compared to the stabilization period. This can be attributed to reforms curbing government expenditure, bolstering state support mechanisms, and amplifying the role of the private sector. Consequently, the share of investment spending in total government outlay witnessed a decline.

- **Economic Recovery and Growth Support Program (2001-2009)** :During the Economic Recovery Program (2001-2003) and the Economic Growth Support Program (2005-2009) in Algeria, fiscal policy endeavors aimed to rectify existing challenges and offset delays

accumulated during the tumultuous period known as the black decade. The injection of a substantial financial package amounting to \$55 billion under the Economic Growth Support Program was geared towards expanding public services, enhancing living standards, and bolstering human capital and infrastructure development. This proactive approach translated into a noticeable uptick in government expenditure, marked by robust growth driven by economic, social, and political advancements. Notably, investment spending saw a remarkable surge in comparison to current spending, propelling government expenditure to reach 100% of GDP, primarily attributable to the substantial funding channeled into economic initiatives.

- Growth Consolidation Program and Five-Year Development Program (2010-2019) : The Growth Consolidation Program (2010-2014) and the Five-Year Development Program (2015-2019) in Algeria marked significant phases of expenditure escalation, with substantial allocations of \$286 billion and \$280 billion, respectively. These initiatives aimed at elevating living standards, advancing infrastructure projects, and fostering economic growth. Despite fluctuations in government spending between 2010 and 2013, there was an overall surge of 113% in expenditures. This growth occurred even amidst the 2015 oil shock, prompting the initiation of a government spending rationalization policy in 2016.

- Crises and recent years (2017-2021)* From 2017 to 2021, public spending decreased to 88% of GDP, due to the economic and financial crises that Algeria went through, including the global health crisis (Corona pandemic) that prompted the government to significantly reduce its spending. --- This formulation explains the main changes in public spending in Algeria and explains them according to the economic and political conditions that the country went through.

Total fixed capital formation TFC: A concept in macroeconomics used in official national accounts. It measures the value of the producer's holdings, minus fixed assets disposed of during the accounting period, in addition to certain additions to non-producing assets. It indicates the strength of an economy in creating investment and capital wealth at the head of the national economy. Based on the

statistics we have, we will notice the development of total fixed capital during the period 1990-2021.

- **During the period from 1990 to 1994**, Algeria witnessed a disturbance in the formation of fixed capital as a result of economic instability, internal and external imbalances, and the external debt crisis. The rate of fixed capital formation rose from 25% to 27% during this period.

- **Between 1995 and 1999**, The crisis stemming from the oil price decline in 1986, coupled with security and political turmoil and escalating external debt, prompted the Algerian government to seek debt rescheduling. This led to the implementation of a structural adjustment program in collaboration with the International Monetary Fund. As a result, the rate of fixed capital formation dipped from 29% to 22% in 1997, rebounded, then dropped again to 20% in 2000. Subsequently, from 2001 to 2004, Algeria experienced an upsurge in fixed capital formation, stabilizing at 24%. This upturn can be attributed to the recovery from the nineties crisis, sustained reform efforts, and the successful transition to a market economy, characterized by amplified investment spending.

- **Between 2005 and 2009**, During this period, there was a focus on infrastructure projects and heightened investment in the housing sector to enhance living standards and attract local and foreign investments to stimulate growth. The rate of fixed capital formation notably surged from 22% to 38%. Between 2010 and 2014, this rate continued to rise, propelled by the proliferation of small and medium enterprises and state-backed investment initiatives under the economic recovery program, culminating in a rate of 43% in 2016.

- **From 2017 to 2020**, Algeria witnessed a decline in fixed capital formation, as the rate continued to decline to 38% due to the Covid-19 crisis, the decline in investment projects, and the freezing of investment opportunities in the country.

Exports outside the hydrocarbon sector EXPOH: Non-oil exports in Algeria refer to goods and products exported from the country that are unrelated to the oil and gas sector, a pivotal variable in our analysis based on available data.

The impact of non-oil exports on sustainable development in Algeria: an empirical study during the period (1990-2022)

During the nineties, the contribution of non-oil exports in Algeria remained modest, not surpassing 30% due to the economic challenges faced by the country. Despite some incremental improvements in subsequent years, the share of non-oil exports to GDP stood at 35% in 2001 and 2002, underscoring the fragility of the production system and the limited diversity in the industrial landscape that was envisioned as an alternative to the dominant oil sector. The government's objective during this period was to achieve non-oil exports amounting to \$4 billion.

However, from 2003 to 2008, despite the overall increase in total exports attributed to rising oil prices, the contribution of non-oil exports remained low, constituting only 1.3% of total exports, equivalent to \$1.4 billion.

- **In 2009**, non-oil exports experienced a similar decline to that of oil exports, declining by 35% compared to 2008.

- However, non-oil exports recovered weakly between 2010 and 2014, thanks to the efforts made in this sector, the economic recovery program, the growth support program, and the increase in oil prices from \$50.6 in 2005 to \$77.4 in 2010.

- **Between 2010 and 2015**, Non-oil exports in Algeria experienced a notable resurgence, reaching 38% during the economic growth consolidation program. However, they witnessed a 7% decline in 2014 due to the oil crisis. This downward trend persisted until 2020, with non-oil exports dwindling to 17% amidst the Covid-19 crisis. Nonetheless, there was a rebound to 20% in 2021, attributed to government policies aimed at diversifying non-oil exports in response to volatile oil prices in the global market.

Gross Domestic Product (GDP) serves as a monetary gauge of the market worth of all goods and services produced within a specific timeframe. It serves as a barometer of a nation's economic vitality, progress, and the capacity of local development to contribute to such variables and state revenues. It is expressed by the following equation:

- (C): Personal consumption
- (CIF): Gross fixed capital formation
- (DEPP): National government spending

- NX: Net exports (exports - imports)
- ε : Random error
- $\alpha_1, \alpha_2, \alpha_3$: Study parameters

From the Algerian GDP data spanning 1990 to 2021, we observe significant transformations in the country's economic landscape:

- In the early nineties, Algeria experienced meager GDP growth rates, with a peak of 2.1% in 1991.
- Subsequently, there was a modest upturn in 1992, registering a growth rate of 1.8%, attributed to the aftermath of the 1986 oil price slump and the shift towards a market-oriented economy.
- By early 1995, the economic growth rate surged to 3.7%, only to drop to 1.1% in 1997.
- A notable spike to 5.1% occurred in 1998 before facing another decline. The average growth rate from 1990 to 2000 hovered around 1.67%, influenced by the IMF structural adjustment program and dwindling investment volumes, with economic growth heavily reliant on the hydrocarbons sector.

The implementation of the economic recovery support plan from 2004 to 2011 aimed at boosting economic growth rates in Algeria, leading to a notable improvement. Growth peaked at 7.2% in 2003, driven by enhancements in the hydrocarbons and agricultural sectors, with the latter achieving a remarkable 17% growth. However, growth tapered to 4.3% in 2004, falling short of the ambitious targets set despite substantial investments.

During the 2005-2009 period, the supplementary growth support program was initiated, accompanied by a rise in public spending to GDP ratio from 28% in 2000 to 42% in 2009. However, growth rates remained modest, seldom exceeding 5%, such as the 5.89% growth in 2005. The rate plummeted to 1.59% in 2009 due to the decline in oil prices amidst reduced demand and the global financial downturn.

From 2010 onwards, Algeria saw an upturn in economic growth, with the rate climbing from 1.63% in 2009 to 3.63%. This trend

persisted until 2014 when growth dipped due to falling oil prices, yet rebounded to 3.79% that year. In 2015, Algeria sustained a solid growth rate of 3.76%, although it slightly decreased to 3.3% in 2016.

In 2016, the hydrocarbon sector in Algeria experienced a significant upturn, showcasing a growth rate of 7.7%, a stark contrast to the mere 0.2% growth seen in 2015.

However, the economic landscape took a downturn in 2017, primarily due to a substantial decline in the hydrocarbon sector, resulting in an overall growth rate of 1.6%, while growth in non-hydrocarbon sectors remained relatively steady at 2.2%.

The year 2020 posed challenges for the Algerian economy, marked by a contraction in growth attributed to the repercussions of the Covid-19 pandemic. The non-oil sector was particularly impacted by economic closures, compounded by a 12% decrease in oil production from 1,023 thousand barrels per day in 2019 to 899 thousand barrels per day in 2020.

second Requirement: Model Presentation and Data Analysis

We conduct a standard study using the Robert Solow model 1956, which adopted the equation: $Y = F(K, L)$

And was developed by Greg Mankiw in 1973.

To conduct an analysis using the Ordinary Least Squares (OLS) method to study the relationship between sustainable development as a dependent variable and fixed capital, non-oil exports, and total spending as independent variables in Algeria during the period 1990-2023, using the Eviews12 program

Gross Domestic Product increased by 6.4% in the same year.

Variables

- **Dependent variable:** Gross Domestic Product (GDP).

- **Independent variables:** Non-oil exports, fixed capital, and public spending.

Determine the model - Study the impact of non-oil exports, fixed capital, and public spending on GDP. Provide the model used in the analysis. For example :

$$\{GDP\}_t = \beta_0 + \beta_1 EXOH_T + \beta_2 CIF_T + \beta_3 DEEP_T + \varepsilon_T -$$

Where :

GDP: Gross Domestic Product

(CIF): Gross Fixed Capital Formation

(DEPP): National Government Spending

EXOH: Non-Oil Exports

ε : Random Error

$\beta_0 + \beta_3 + \beta_2 \beta_1$: Study Parameters

third Requirement: Model Estimation:

After estimating the model with Eviews 12, we obtained the following table

Table 02: Model Estimation Results

Dependent Variable: GDP Method: Least Squares Date: 09/10/24 Time: 15:52 Sample: 1990 2023 Included observations: 34				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.67E+10	1.45E+10	-3.211712	0.0031
DEEP	1.063327	0.088316	12.04003	0.0000
EXOH	0.010412	0.002899	3.591990	0.0012
CEF	-0.002365	0.001816	-1.302340	0.2027
R-squared	0.976167	Mean dependent var	1.29E+11	
Adjusted R-squared	0.973784	S.D. dependent var	7.29E+10	
S.E. of regression	1.18E+10	Akaike info criterion	49.33143	
Sum squared resid	4.18E+21	Schwarz criterion	49.51100	
Log likelihood	-834.6343	Hannan-Quinn criter.	49.39267	
F-statistic	409.5864	Durbin-Watson stat	0.725602	
Prob(F-statistic)	0.000000			

Source: Prepared by the researcher using EViews.10

▪ **Analysis and discussion of results**

_ Probability (P-value): If it is less than 0.05 (at a 5% significance level), this means that the coefficient is significant.

_ The coefficients in the image are the study coefficients that were used in the economic model to analyze the relationship between non-oil exports and GDP.

_ Coefficient C is the constant in the model and represents the value of GDP when non-oil exports, national government spending, and fixed capital formation are zero. The value of coefficient C is 4.67, the standard error of this coefficient is 1.45, the value of T is 3.21217, and the probability value is 0.0031

Interpretation: The negative constant coefficient in the equation indicates that GDP value turns negative when all independent variables are zero, reflecting a deficit or weak economic performance

in the absence of non-oil exports and other factors driving economic growth.

The DEPP coefficient, representing national government spending, holds a value of 1.06312, with a standard error of 0.088316. The T value stands at 12.40003, and the probability value is 0.0001, signifying a statistically significant impact of government spending on the model.

Interpretation: The analysis reveals a positive relationship between government expenditures and GDP, indicating that a 1% increase in public spending results in a 1.06% rise in GDP. The favorable coefficient for government spending signifies that its expansion contributes to sustainable development in Algeria, aligning with the crucial role of governments in emerging economies. Effective allocation of investments by governments in key sectors is vital to stimulating the economy and attaining development objectives.

On the other hand, the EXOH coefficient, representing non-oil exports, holds a value of -0.01040, with a standard error of 0.00. The T value is 3.591990, and the probability value is 0.0012, suggesting a statistically significant impact of non-oil exports on the model.

Interpretation: The data reveals a positive correlation between expenditures and GDP, with a 1% increase in non-oil exports leading to a 0.01% growth in GDP. This positive coefficient indicates that enhancing non-oil exports supports sustainable development by promoting economic diversification, productivity, cash flow optimization, innovation, and job creation. It highlights the importance of developing non-oil sectors to foster sustainable economic progress and reduce dependency on finite natural resources like oil.

Conversely, the CEF coefficient representing fixed capital holds a value of 0.00245, with a standard error of 0.001819. The T value is -3.502940, and the probability value is 0.027, indicating a statistically significant impact of fixed capital on the model.

Interpretation: The analysis shows an inverse correlation between fixed capital and GDP, with a 1% increase in fixed capital resulting in a 0.002% decrease in GDP. The negative and insignificant coefficient

indicates that investments in fixed capital have not effectively supported sustainable development during the study period. This suggests potential issues with investment quality or asset utilization. To enhance sustainable development, it is crucial to improve resource management, invest in human capital and technology, and reassess government policies regarding infrastructure and fixed asset investments.

The R-squared value of 0.976167 signifies the model's strong ability to elucidate the available data, showcasing its explanatory power in understanding the relationship between economic variables.

The coefficient of determination of 0.97 signifies that the model effectively captures the majority of variations in sustainable development through the independent variables (non-oil exports, fixed capital, total spending), highlighting its robustness and strong reliance on these factors. This indicates that the model is highly dependent on these variables for explaining changes in sustainable development.

The standard error of the estimate value, at 1.187E-10, reflects the model's exceptional accuracy in estimating GDP, bolstering confidence in its predictive capabilities and demonstrating precise estimations of actual values.

The Akaike information criterion value of 49.33140 and the Schwarz criterion value of 49.33100 both indicate the model's complexity and its capacity to elucidate the data effectively. The Log-likelihood value of -434.3241 showcases how well the model aligns with the data, further underlining its fitting accuracy.

AIC and SC indicate that the model is balanced between accuracy and complexity. Close values increase confidence in the model. Log-Likelihood indicates a reasonable fit between the model and the data, but it can be improved to provide better results.

The high F-statistic value (409.6643)

The statistical analysis indicates a robust model with high significance, showing that the combined independent variables effectively explain variations in the dependent variable. The low Prob(F-statistic) value reinforces the model's statistical validity, affirming that the results are not random occurrences. This boosts

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confidence in the model's reliability and its ability to elucidate the interplay among economic variables.

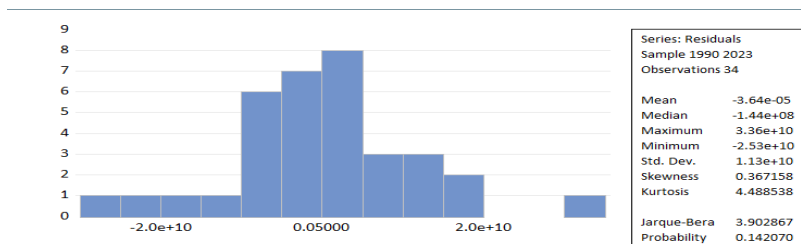
The study's model underscores the pivotal role of non-oil exports, government spending, and fixed capital as fundamental drivers of sustainable development in Algeria. The findings strongly suggest that enhancing these factors can bolster long-term sustainable economic growth. It is essential to prioritize these elements without neglecting any, as they collectively underpin economic stability and progress.

▪ **Residuals Analysis**

After ensuring the significance of the coefficients and the model as a whole, move on to studying the residuals to assess the validity of the assumptions on which the least squares analysis is based.

- Normal distribution of residuals Jarque-Bera test gives a value of -value greater than 0.05, which indicates the validity of the hypothesis that the residuals are normally distributed.

Figure 01: Normal distribution test for estimated model remainders



Source: Prepared by the researcher using EViews.10

- Homoscedasticity test: Breusch-Pagan-Godfrey. If the -value is less than 0.05, this means that there is a problem of heteroscedasticity that needs to be addressed. This is what we see in the figure, so there is homoscedasticity of variance.

Table 03: Results of Estimating the Heterogeneity Test for Error Variances

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	4.976432	Prob. F(3,30)	0.0064
Obs*R-squared	11.29766	Prob. Chi-Square(3)	0.0102
Scaled explained SS	15.34217	Prob. Chi-Square(3)	0.0015

Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 09/10/24 Time: 18:50				
Sample: 1990 2023				
Included observations: 34				

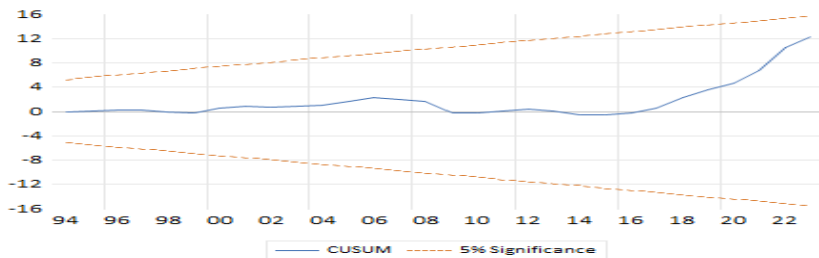
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.04E+20	2.46E+20	-0.420972	0.6788
DEEP	-1.86E+09	1.49E+09	-1.246347	0.2223
EXOH	32826894	49054289	0.669195	0.5085
CEF	71639122	30726798	2.331487	0.0266

Source: Prepared by the researcher using EViews.10

■ Stability Tests

Check the stability of the model over time: Use the Cusum Test or the Cusum of Squares Test to check whether the model coefficients are stable over time. If the graph indicates the stability of the model, this means that the model is strong and stable over the period of time studied. This is what the following figure shows us. We notice that the graph is within the confidence interval, which indicates the stability of the model.

Figure 01: Cusumq-Cusum structural stability test



Source: Prepared by the researcher using EViews.10

CONCLUSION:

Through studying the subject, we reached the following results:

_There is a direct relationship between government spending and economic development, such that the more government spending increases by one unit, the more it contributes to increasing economic development, which is consistent with Keynesian theory.

_Total fixed capital formation is a key macroeconomic concept used to evaluate the value of fixed assets owned by businesses, governments, and households. It is a component of gross domestic

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product (GDP) expenditure and reflects new investment in the economy, contributing to sustainable development. In Algeria, however, studies indicate a negative impact of fixed capital formation, likely due to insufficient productive and investment infrastructure, particularly affecting small and medium enterprises and subcontractors.

_The study found a positive correlation between exports and economic development in Algeria, but non-oil export revenues remain limited. This highlights the need to enhance the export development strategy, as the heavy reliance on oil hampers diversification and progress. Therefore, there is an urgent requirement for more effective strategies to promote non-oil exports and support sustainable development in Algeria.

Recommendations

_Enhancing non-oil exports: Encouraging policies that support and increase non-oil exports to promote sustainable economic growth in Algeria. Focusing on improving product quality and increasing access to global markets.

_Increasing government spending on development projects: Enhancing government spending in vital sectors such as infrastructure, education and health to promote economic growth and achieve sustainable development.

_Reviewing fixed capital investment strategies: Improving the quality of fixed capital investments and directing them towards projects that effectively support economic growth. Re-evaluating policies related to investment in infrastructure and fixed assets.

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