

An Empirical Analysis of the Determinants of Public Revenue in Algeria's Tourism Sector

تحليل محددات المداخيل العامة للقطاع السياحي في الجزائر

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Abstract:

This study aims to empirically analyze the determinants of public revenue in Algeria's tourism sector by conducting an analytical and econometric examination based on annual data from the period 2000 to 2024. The Autoregressive Distributed Lag (ARDL) model was employed to explore the relationship between public tourism revenue and key explanatory variables, including total tourist nights, total tourist arrivals, and employment in the tourism sector. The results reveal a positive relationship, both in the short and long term, between public tourism revenue and both total tourist nights and tourist arrivals. In contrast, a negative relationship was found between public tourism revenue and the number of employees in the tourism sector during the same period.

Keywords: tourism sector, tourism revenue, tourism employment, tourist nights, tourism.

Jel Classification Codes : Z32 ; H27 ; Q52 ; L83 ; Z38.

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Introduction:

During the first decade of the twenty-first century, the rise in fuel prices on international markets increased the Algerian state's hard currency resources, which allowed it to implement ambitious economic and social policies that relied on the state budget for their implementation. During the period (2000-2023), hydrocarbons accounted for an average of 93% of the country's exports, 43% of tax revenues, and 21% of GDP.

However, since mid-2014, low fuel prices have highlighted weaknesses in this economic model. The average price of a barrel of Algerian oil (Sahara Blend) fell from US\$113 per barrel in mid-2014 to US\$31 in early 2016, before entering a phase of volatility in the following years to stabilize in 2020. In the range of US\$70 per barrel, as a result, the state's general accounts (including external payments accounts) deteriorated significantly: the budget deficit reached 15% of GDP in 2015 (15.9% in 2020), and economic growth was also affected, falling from 3.7% in 2015 to 0.7% in 2019, stabilizing at 3.5% in 2020.

Based on the previous importance, this study attempts to address the following problem:

"What are the key determinants of public tourism revenue in Algeria, and how do factors like tourist arrivals and employment impact these revenues ?"

The importance of the study: The importance of the study stems from the contributions expected to be added at the scientific and practical levels through the analysis and assessment of the causal relationship between tourism profitability on the one hand and the total fence arrivals/tourist nights and tourism employment rates on the other hand.

Objectives of the study: Understanding the composition of the tourism sector increases the effectiveness of the support and accompaniment tools provided by state institutions, as the study aims to achieve the following objectives:

- Track the evolution of tourism revenues in Algeria during the study period.
- Estimating a model of tourism profitability based on dependent and independent variables.
- Determine the direction of the relationship between total inbound tourism, total tourist nights, and tourism employment rates on the one hand and the growth of tourism revenue on the other hand as an indicator of tourism development.

Study hypotheses: The study relied on the following hypotheses:

- **The first hypothesis:** There are objective indicators of statistical significance that the increase in total inbound tourism and tourist nights positively affects the increase in tourism productivity.
- **Second hypothesis:** There are objective indicators with statistical significance that the increase in the rate of tourism employment positively affects the increase in tourism profitability.

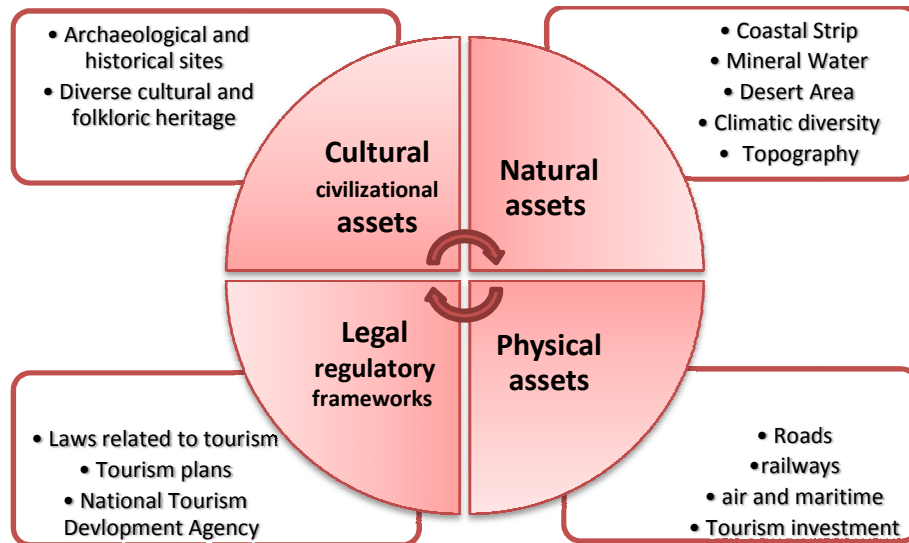
Study Methodology: In this study, the descriptive analytical approach was relied upon, and the self-regression methodology of slowed distributed time gaps (ARDL) was used in building and analyzing the estimated relationship model between the study variables, using the statistical program (eviews.9) in the long and short term.

I-Tourism potential in Algeria:

With an area of 2.4 million km² and demographic dynamics (+900,000 inhabitants/year, 44 million as of January 1, 2020), Algeria ranks fourth in Africa's GDP (US\$165 billion in 2020) and has the highest GDP per capita in North Africa.

According to the various possibilities available, Algeria can be a tourist destination par excellence by developing a clearly defined strategy that includes in its pockets a roadmap for the development and improvement of the efficiency of the tourism sector, increasing its participation in economic development, and saving hard currency.

Figure n°1. Elements and pillars of the tourism sector in Algeria



Source: NawalKhaTar, AbdallahKalach: Assessing the Performance of the Algerian Tourism Sector under the Tourism Development Master Plan (SDAT).

I-1- Natural Assets:

Algeria's natural resources that can help develop the tourism sector are summarized in the natural terrain that combines the coastline (1644 km) with its beaches for swimming (588 exploited beaches) adjacent to the forest mountains in the north, followed by the high plateaus with a temperate climate, then the semi-desert areas in the center, and then the vast desert of the south of the country (2 million millionkm²) that extends to the business of Africa. Algeria combines a Mediterranean climate with a dry desert climate and a continental climate in the center, in addition to being rich in febrile water springs used for treatment and recreation (282 exploited febrile sources, 18 febrile compounds), not forgetting the barns located throughout the country (El Kala, Jarjara, Tassili, and others).

I-2- Physical Assets:

Algeria has (112,698 km) of land roads, including 1,216 km of highway linking the east of the country with the west, in addition to 2,150 km of railway network, about 15% of which is electrified, and it also owns 15 international airports and 29 domestic airports. Air transport services monopolize the public companies with a total fleet of 100 aircraft with an average age of 11 years. As for the investments of a tourist nature, they are represented in hotels (1449 institutions). Hotel in 2020), of which 53% are classified and 47% are not classified, with a shelter capacity of 127,614 beds, in addition to 4,256 tourist agencies.

I-3- culturaland Civilizational Assets:

The diversity in the cultural and civilizational heritage of Algeria is due to its great and continuous contact with different peoples and civilizations during successive eras, where we find the Phoenician, Numidian, and Roman touch in the urban art of cities (Tipaza, Cherchell, Jamila, Tennes, and Timgad), and the rock inscriptions discovered in the oasis of Taghit indicate the presence of important ancient civilizations. About a hundred kilometers from the city of Tamanrasset, the tomb of Queen Tin Henan of the South is also known for its stone inscriptions, especially on the mountain of the raid of madness, where we distinguish pets and savages. These drawings were crowned nearly 2700 years ago before our era, and they are one of the most beautiful murals in the desert. The eastern region of the country also contains the largest reserves of historical monuments, and most of these sites are classified and contribute to the definition of the region. 30 km from Constantine is the site of Tides, a small Numidian town that hides many of the traces of this era, which the Romans modified according to their own construction rules.

I-4- Legal and regulatory frameworks:

The Ministry of Tourism and Handicrafts, as the governing body of the tourism sector, oversees its development through the establishment of a comprehensive legal and regulatory framework. This includes laws such as Law 03/03 concerning tourism expansion zones and designated tourist sites. In parallel, the Ministry is actively implementing a strategic development program — the Tourism Development Directive Plan (SDAT 2030) — aimed at enhancing the overall structure and competitiveness of the tourism industry.

Moreover, the National Tourism Development Agency plays a key role in facilitating tourism investment by making tourism-related real estate available to investors.

Beyond these institutional and regulatory efforts, one notable factor that strengthens the sector's potential contribution to national economic development is the competitive advantage resulting from the depreciation of the Algerian dinar. The low value of the dinar makes Algeria an affordable destination for foreign tourists, thereby increasing its appeal on the international tourism market.

II-Evolution of tourism sector performance indicators in Algeria:

It can be said that the tourism sector has witnessed wide mobility since the beginning of the new millennium and Algeria's adoption of successive development programs (the economic recovery program and the programs loyal to it), where the hotel hangar was strengthened by an increase of 1449 hotels, in addition to extensive investments in infrastructure (trains, ports, etc.) that undoubtedly help in the development of the tourism sector.

II-1- Development of the hotel in Algeria:

As part of its efforts to enhance the tourism sector, Algeria has invested significantly in the development and modernization of hotel infrastructure across both the public and private sectors. These initiatives are aligned with the national tourism development strategy, as outlined in the Tourism Development Master Plans (SDAT 2025) and (SDAT 2030).

The table below illustrates the evolution of Algeria's hotel capacity during the period from 2000 to 2023. Given that hotels represent one of the most essential components for attracting tourists, the expansion and improvement of the national hotel stock is of strategic importance. In parallel, efforts must also focus on enhancing the quality of hotel services, ensuring a high standard of comfort and satisfaction for visitors.

Table (01) illustrates a gradual upward trend in the number of hotel establishments in Algeria between 2000 and 2023, rising from 827 hotels in 2000 to 1,449 in 2023 — an overall increase of approximately 75% over two decades. Despite this growth, the increase remains modest in light of the substantial efforts and financial resources invested in the sector. A significant concern is that the majority of these establishments — nearly 75%—remain unclassified and lack international recognition. Furthermore, they are largely absent from major global tourism and booking platforms such as Booking, Accor, and others. This lack of visibility severely limits their accessibility to international tourists and poses a major obstacle to the integration of Algeria's hospitality sector into the global tourism market.

Table n°1: Elements and pillars of the tourism sector in Algeria

years	Number of hotel establishments	Accommodation capacity (beds)	Total overnight stays
2000	827	58320	3748135
2001	927	62677	4028286
2002	935	64237	4128567
2003	1042	67295	4324238
2004	1057	70660	4543057
2005	1105	73189	4705637
2006	1134	76293	4905216
2007	1140	79632	5119940
2008	1147	83156	5346543
2009	1151	87813	5645828
2010	1152	92377	5939334
2011	1184	94021	6329472
2012	1155	96804	6640181
2013	1176	98804	6921234
2014	1185	99605	7053744
2015	1195	102244	7146572
2016	1231	107420	7276521
2017	1289	112264	7406181
2018	1368	119155	7565733
2019	1417	125676	6815873
2020	1449	127614	2242517
2021	1523	113453	2345368
2022	1582	144881	3421357
2023	1638	151052	5794327

Source: Ministry of Tourism and Handicrafts Official website.

Over the period from 2000 to 2023, Algeria's hotel sector saw significant growth in both the number of hotel establishments and accommodation capacity. The number of hotels increased steadily from 827 in 2000 to 1638 in 2023, reflecting the country's efforts to expand and modernize its hospitality infrastructure. This growth in hotel establishments indicates a strong commitment to developing the tourism sector, likely to meet both domestic and international demand. The substantial increase in the number of beds, from 58,320 in 2000 to 151,052 in 2023, further highlights the country's strategy to cater to a growing number of tourists.

However, despite this expansion, the total number of overnight stays followed a somewhat uneven trajectory. While there was a general upward trend in overnight stays from 3.75 million in 2000 to 5.79 million in 2023, the data reveals a sharp decline in 2020, falling to just 2.24 million due to the global pandemic. This drop underscores the vulnerability of the tourism sector to external shocks, such as global health crises. Nevertheless, the sector showed remarkable resilience, with a strong recovery in 2021 and 2022, and 2023 saw the highest number of overnight stays in the series.

The significant growth in both the number of hotels and beds indicates that Algeria is positioning itself to handle an increasing volume of tourists. However, the relatively slow increase in overnight stays compared to the rise in hotel capacity suggests that the sector could benefit from further marketing efforts and improvements in attracting international visitors. Algeria's tourism industry must continue to evolve, focusing on enhancing the quality of services and promoting the country's unique cultural and natural attractions to fully leverage its expanded hospitality infrastructure.

II-2- Development of inbound tourism:

The inbound tourism index measures the number of international tourists visiting Algeria within a specific time frame and is widely regarded as one of the most accurate indicators of the tourism sector's performance and development. The figure below illustrates the trend in the number of inbound tourists to Algeria over the period from 2000 to 2023.

Figure n°2: Development of tourist arrivals to Algeria for the period (2000-2023)



Source: Ministry of Tourism and Handicrafts Official Website

Based on statistical data from 2000 to 2023, the number of Algerians residing abroad who visited Algeria showed a significant upward trend in the early years, rising from around 690,000 in 2000 to a peak of over 1.7 million in 2013. However, starting in 2014, this number began to decline sharply, with a dramatic drop in 2015 to less than 630,000 visitors. This decline may be attributed to political or economic factors or possibly disruptions in transportation services. In recent years (2021–2023), the numbers have begun to recover, reaching over 1.09 million visitors from the diaspora in 2023.

The number of foreign tourists, on the other hand, has shown a steady and consistent increase over the same period, growing from approximately 175,000 in 2000 to more than 2.1 million in

2023. This positive trend suggests that Algeria is gradually establishing itself as an international tourist destination. Notably, since 2015, the number of foreign tourists has surpassed that of Algerians residing abroad for the first time, indicating a shift in the structure of incoming tourism. This growth may be linked to improved security conditions, policy reforms, and the country's rich natural and cultural heritage.

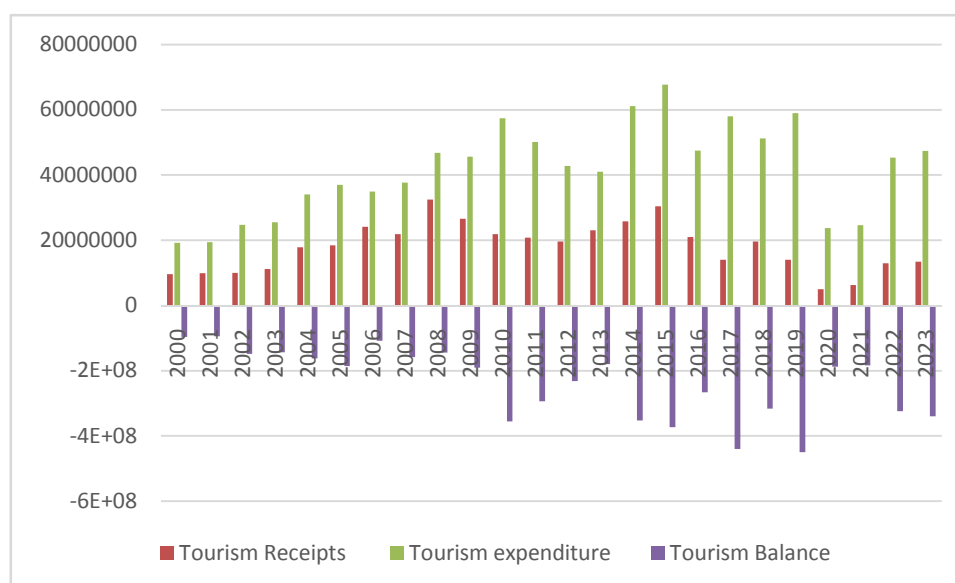
As for the total number of incoming tourists, the sector experienced general growth—from about 866,000 visitors in 2000 to over 3.2 million in 2023—despite occasional fluctuations. The tourism industry was hit hard by the COVID-19 pandemic in 2020, with the number of arrivals dropping to just over 591,000, the lowest point in the time series. However, the strong and rapid recovery in the following years demonstrates the sector's resilience and the untapped potential of Algerian tourism. This rebound presents an opportunity to further invest in the industry and promote it as a key pillar of the national economy.

II-3-Evolution of tourism revenues:

The tourism balance index is considered one of the key indicators used to evaluate the performance and efficiency of a country's tourism sector. It reflects the net outcome of international tourism revenues—generated through the influx of foreign tourists and the resulting inflow of foreign currency—against the expenditures incurred by Algerian citizens traveling abroad for tourism purposes, which constitute an outflow of foreign currency.

The figure below illustrates the evolution of Algeria's tourism balance over the period 2000 to 2023, providing insights into the sector's economic contribution and its impact on the national balance of payments.

Figure n°3: Evolution of the tourism balance in Algeria for the period (2000-2023)



Source: World Bank data (www.donneesmondiales.com/afrique/algerie/tourisme.php)

Tourism receipts showed gradual growth between 2000 and 2015, increasing from approximately \$95.7 million to over \$304 million in 2015. This reflects some effort in attracting international visitors and improving tourism offerings. However, after 2015, the trend became

unstable, with noticeable declines, especially in 2020 due to the COVID-19 pandemic, when receipts dropped sharply to just \$49.9 million. The years 2021 to 2023 show signs of slow recovery, indicating a cautious rebound of the tourism sector, though still far from pre-pandemic levels.

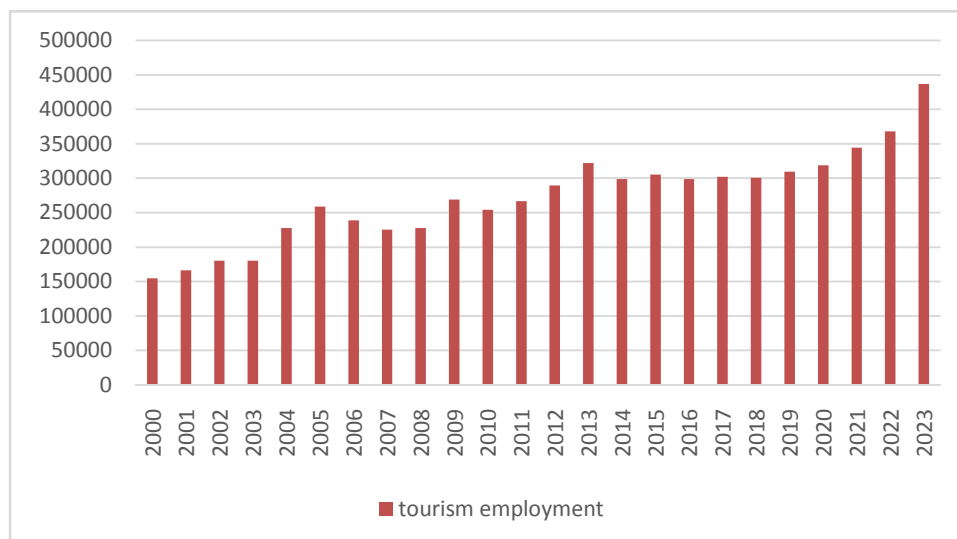
Tourism expenditure consistently increased over the years, nearly tripling from 2000 to 2010 and peaking at over \$590 million in 2019. This suggests a growing tendency among residents to travel abroad for tourism, possibly reflecting weaknesses in domestic tourism infrastructure or lower attractiveness compared to international destinations. Even during the pandemic years, spending remained relatively high, underlining the strong outward tourism demand and the need to redirect some of this demand toward local destinations.

The tourism balance remained negative throughout the entire period, indicating a persistent deficit in the tourism account. While there were relatively better years, such as 2006, the overall trend worsened over time, reaching the highest deficit in 2019 with approximately -\$450 million. The pandemic years did not improve the situation significantly, as both receipts and expenditures dropped. This persistent imbalance highlights the need for strategic reforms to enhance inbound tourism, strengthen domestic tourism offerings, and ultimately reduce the country's tourism deficit.

II-3-Development of tourism employment:

Given the special nature of the tourism sector as a service sector, it attracts a large percentage of human resources, so this sector is often seen as the engine of the operational machine in the economy, as it provides direct (seasonal and permanent) and indirect jobs. In the international tourism custom, increasing the number of tourists (02) leads to the creation of a direct job position and two indirect positions in sectors related to the tourism industry. Referring to the case of Algeria, the contribution of the tourism industry to job creation is illustrated in the following figure:

Figure n°4: Development of tourism employment in Algeria for the period (2000-2023)



Source: World Travel and Tourism Council, Official Website (<https://wtcc.org>2023)

The number of individuals employed in the tourism sector has shown an overall upward trend from 2000 to 2023. Starting with approximately 154,738 workers in 2000, employment steadily increased to reach 305,453 by 2015. Despite minor fluctuations in some years, such as dips in 2006 and 2020, the sector shows a strong recovery in 2023.

and 2007, the growth resumed in the following years. A particularly notable rise is seen from 2021 to 2023, with employment jumping from 344,308 to 436,679 workers, possibly reflecting post-pandemic recovery and growing interest in developing the tourism sector.

The direct employment rate in tourism, as a percentage of total national employment, remained relatively stable between 2000 and 2020, ranging between 2.4% and 3.04%. The highest rate was recorded in 2005 at 3.04%, showing a peak in tourism's direct contribution to employment. Although the employment rate fluctuated slightly, it indicates that tourism consistently held a modest but significant role in national job creation. Unfortunately, data for this rate is missing for the years 2021–2023, which limits the ability to assess recent trends in employment impact.

This dataset highlights that tourism employment is a steadily growing sector in terms of absolute job numbers, even during periods of economic challenge. The resilience of job growth—especially the strong rebound after 2020—suggests that tourism is seen as a priority area for economic diversification and youth employment. However, the relatively low direct employment percentages signal a need to further integrate tourism into the national economy, promote local enterprises, and develop sustainable tourism models that can absorb more of the labor force.

III-Estimating the profitability of the tourism sector in Algeria

The figures presented in the previous indicators related to the development and performance of Algeria's tourism sector remain insufficient to conclusively assess the sector's actual profitability. Several structural and contextual factors must be taken into account.

First and foremost is the specific nature of the Algerian economy, which relies heavily on imports to meet the demand for consumer goods — including those used in the provision of tourism services. This dependency significantly impacts the cost structure and value-added potential of the sector.

Additionally, Algeria's social policy framework is characterized by a widespread system of subsidized pricing (price support), which affects not only basic goods but also a range of services, many of which are directly or indirectly linked to the tourism experience. This artificial pricing distorts the real economic value of services provided and complicates the accurate assessment of profitability within the tourism sector.

III-1- Define variables and formulate the standard model:

The standard model adopted in this study is designed to examine the relationship between a set of independent variables and a dependent variable within a time series framework. Specifically, tourism revenues (TR) for the period 2000–2023 are considered the dependent variable, while the following indicators are used as explanatory (independent) variables:

- Total Tourist Nights (TTN)
- Total Tourist Arrivals (TTA)
- Number of Tourism Employment (NTE)

These variables are structured into a mathematical model that captures the general trend of the estimated relationships among them. The data for the study were sourced from various reputable institutions: tourism revenues (TR) were obtained from the World Bank database; total tourist nights (TTN) and tourist arrivals (TTA) were extracted from the statistical yearbooks of the

Algerian Ministry of Tourism; and data on tourism employment (NTE) were gathered from the World Travel and Tourism Council (WTTC) covering the same period (2000–2023).

To estimate the profitability of the Algerian tourism sector, this study employs the ARDL (Autoregressive Distributed Lag) approach, developed by M. Hashem Pesaran et al. (2001, p. 292). The ARDL methodology is particularly well-suited for analyzing time series data with mixed levels of integration, and it offers several advantages over traditional cointegration techniques (Messaoud, 2019, p. 314): The ARDL methodology is distinguished by the following key characteristics:

- The ARDL approach can be applied to variables that are integrated of order $I(0)$ or $I(1)$, as long as the variable is stationary at its first difference, making it more flexible compared to other methods that require all variables to be stationary at the same level.
- Unlike other traditional techniques, the ARDL model is considered valid even for small sample sizes, making it advantageous for studies with limited data points.
- The ARDL method allows for the estimation of both short- and long-term relationships between variables within a single equation, offering a comprehensive understanding of the dynamics at play.

The model posits that the time series of the dependent variable is a function of both its own lagged values and the current and lagged values of the explanatory variables, potentially delayed by one or more periods. This relationship is mathematically represented as follows:

$d(Y_t) =$	$c + \lambda Y_{t-1} + \beta X_{t-1}$	$+ 1, id(Y_{t-i}) \sum_{i=1}^m a$	$+ 2, id(X_{t-i}) \sum_{i=0}^k a$	$+ \varepsilon_t$
The dependent variable in the first difference	Long term information area	Short term information area		residuals
		The block slows down the dependent variable on the first difference	The block slows the independent variable at the first difference	

in which:

- (λ) Represents the coefficient of the lagged dependent variable at the level, which is negative and statistically significant, indicating a slowdown over one year.
- (β) Reflects the influence of the independent variable on the dependent variable when lagged by one year at the level.
- $(a1, i, a2, i)$ are the coefficients of the short-term relationship.
- (d) in the expression (Y_t) indicates that the data was taken in its first difference.

III-2- A study of the stability (rest) of the time series.:

The stationarity of a time series implies that its mean and variance remain constant over time and across different time periods. Therefore, it is essential to test for stationarity and address any non-stationarity, as well as determine the degree of integration. Neglecting these steps may result in misleading relationships, often referred to as spurious regressions. (Ashenfelter, 2005, p. 325). In other words, the stationarity of the time series for the study variables ensures that the fundamental properties of time series data are satisfied.

The Augmented Dickey-Fuller (ADF) test was employed to verify whether the time series of the variables contain unit roots. This test is based on the assumption that the series is generated by an autoregressive (AR) process. The null hypothesis ($H_0: \phi = 1$) suggests the presence of a unit root, indicating that the time series is non-stationary. In contrast, the alternative hypothesis ($H_1: \phi < 1$) indicates the absence of a unit root, implying that the series is stationary. The results were obtained using the statistical software EViews 9 and are presented in the following table:

Table n°2: Results of the Time Series Stationarity Tests for the Period 2000–2023

Variables	Level	Total	First difference	
	ADF		ADF	Total
LTR	-	Unstable	2.527969-	Stable**
LTN	2.951141-	Stable*	-	-
TTA	-	Unstable	3.679197-	Stable**
NTE	-	Unstable	3.721120-	Stable*

As shown in the table, all variables—including the dependent variable—are stationary at the first difference, except for the variable (LTN), representing total tourist nights, which is stationary at the level. This mixed order of integration, with variables being stationary at different levels but none at the second difference, justifies the use of the ARDL (Autoregressive Distributed Lag) approach as the most suitable methodology. Accordingly, the proposed model is specified as follows:

$$d(TR_t) = c + \lambda TR_{t-1} + \beta TTN_{t-1} + \beta' TTA_{t-1} + \beta'' NTE_{t-1} + \sum_{i=1}^m a_{1,i} d(TR_{t-i}) + \sum_{i=0}^k a_{2,i} d(TTN_{t-i}) + \sum_{i=0}^k a_{3,i} d(TTA_{t-i}) + \sum_{i=0}^k a_{4,i} d(NTE_{t-i}) + \varepsilon_t$$

III-3-Co-integration testing:

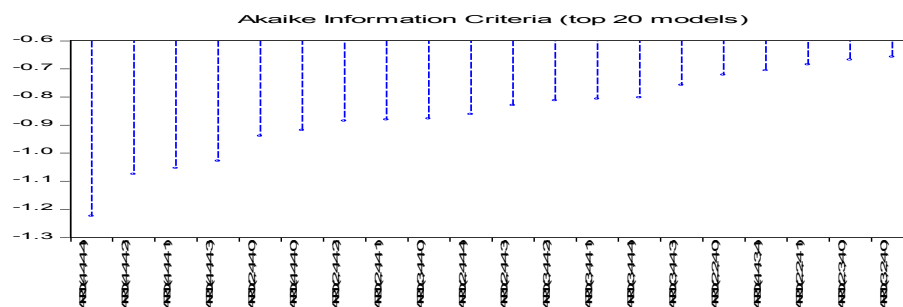
The Bounds Test was employed to assess the possibility of a long-run relationship among the variables in the estimated model. As shown in Table (03), the test results indicate that the calculated F-statistic value ($F = 5.332207$) exceeds the upper critical bounds at all significance levels. Consequently, the null hypothesis of no long-term relationship is rejected, confirming the existence of cointegration among the variables.

Table n°3: Bounds Test Results

k	Value	Test Statistic
3	5.332207	F-statistic
I1 Bound	I0 Bound	Significance
3.2	2.37	10%
3.67	2.79	5%
4.08	3.15	2.5%
4.66	3.65	1%

Source: EVIEWS.9 Outputs

Based on the Akaike Information Criterion (AIC), the optimal lag structure was determined, and the best-fitting model was identified as ARDL (4, 4, 4, 4).



III-4- Estimation and testing of the standard model:

After establishing the presence of a common cointegration among the study variables, we will proceed to examine the long-term relationship between them, followed by a series of diagnostic tests to assess the quality of the estimated model.

III-4-1-Estimation of long-term parameters.

Table n°4: Outputs of estimating long-term parameters

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LTTN	1.177287	0.577381	2.039011	0.0408
LTTA	0.905669	0.689942	1.312675	0.0307
LNTE	-1.429660	0.810384	-1.764176	0.0211
C	5.528847	3.558175	1.553843	0.0642

Source: EVIEWS.9 Outputs

The model's estimated parameters indicate a positive long-term relationship between tourism revenues and both the total number of incoming tourists and tourist nights, whereas the relationship with tourism employment is negative.

III-4-2-UECM error correction model for the short-term ARDL approach.

Table n°5: UECM error correction model outputs.

Dependent Variable: D(LTR)				
Dependent Variable: D(LTR)				
Method: Least Squares				
Sample: 2000 2020				
Included observations: 20				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.477421	6.224183	1.201350	0.0687
LTTN	2.021028	0.622970	3.244183	0.0142
LTTA	0.106977	0.922970	-0.154948	0.0812
LNTE	-1.312540	0.542881	2.417729	0.0459

Source: EVIEWS.9 Outputs

In the short term, the results align with the long-term estimates, showing a positive relationship between tourism revenues and both the total number of tourists and tourist nights, as well as a negative relationship with tourism employment ratios. This is accompanied by a significant error correction term (ECT) with a negative value ($\text{CointEq}(-1) = -1.352438 = \lambda$). The negative sign of the error correction term confirms the adjustment of the system toward long-term equilibrium from the short-term disequilibrium.

III-4-2-Quality and Significance Test Estimated Model

Table n°6: Testing the quality and significance of the model.

R-squared	0.976057	Mean dependent var	19.00167
Adjusted R-squared	0.911069	S.D. dependent var	0.412019
S.E. of regression	0.122869	Akaike info criterion	-1.223841
Sum squared resid	0.105678	Schwarz criterion	-0.263962
Log likelihood	36.52185	Hannan-Quinn criter.	-0.938419
F-statistic	15.01911	Durbin-Watson stat	3.032029
Prob(F-statistic)	0.000625		

Source: EVIEWS.9 Outputs

The Durbin-Watson statistic, which exceeds the value of R-squared, suggests that the model is acceptable and free from spurious regression. Additionally, the high R-squared value indicates that the independent variables explain over 70-90% of the variation in the dependent variable.

III-4-3- Autocorrelation test for errors

Table n°7: Autocorrelation test for errors.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	6.113727	Prob. F(1,3)	0.0454
Obs*R-squared	19.16367	Prob. Chi-Square(1)	0.0001

Source: EVIEWS.9 Outputs

Since the p-value of the F-statistic for the Breusch-Godfrey Serial Correlation LM test is greater than the 1% significance level, we fail to reject the null hypothesis, indicating that there is no autocorrelation of errors in the estimated model.

III-4-4- Contrast Instability Test

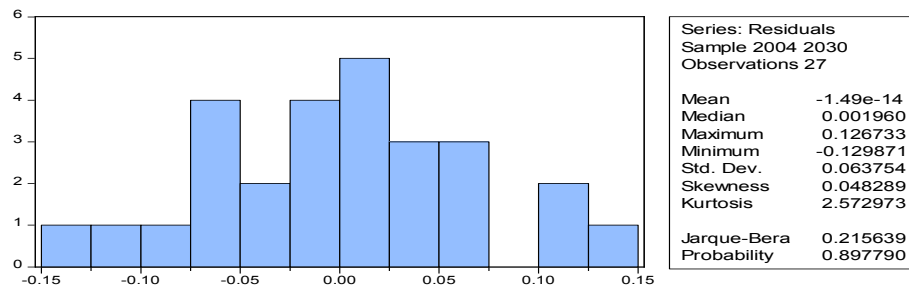
Table n°8: A ARCH test for error variance instability.

F-statistic	1.566549	Prob. F(1,21)	0.2228
Obs*R-squared	1.593108	Prob. Chi-Square(1)	0.2069

Source: EVIEWS.9 Outputs

The outputs of the program for the ARCH test show that the p-value of the F-statistic is greater than the 5% significance level. Therefore, we fail to reject the null hypothesis, indicating that there is no heteroscedasticity in the model. As a result, the model is considered acceptable with respect to the issue of error variance instability.

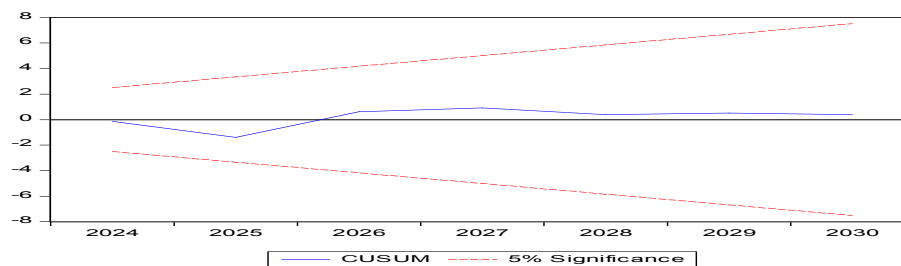
III-4-5- Test the normal distribution of errors.

Figure n°5: Test results for normal distribution of errors.

Source: EViews.9 Outputs

The graph clearly shows that the errors follow a normal distribution, a conclusion that is further supported by the p-value of the Jarque-Bera statistic, which is 0.21. Since this value is greater than the 5% significance level, we fail to reject the null hypothesis, indicating that the residuals from the model estimation follow a normal distribution.

III-4-6- Cumulative Total Test

Figure n°6: CUSUM test results.

Source: EViews.9 Outputs

As shown in the figure, the aggregate values are positioned between the two red lines, indicating that the estimators remain stable over time. This clearly confirms that the variables are stable, and the result is that the estimated equation for the profitability of the tourism sector is stable over time.

III-5- Analysis of the results :

The results of the estimation and the various model tests confirm the validity of the model, starting with the applicability of the Autoregressive Distributed Lag (ARDL) methodology. This suggests that the methodology is suitable for estimating the profitability of the tourism sector, as reflected in the relative variation in annual tourism revenues. The following key findings were reached:

- The ADF test results indicate that the time series is stationary at both the level ($I(0)$) and the first difference ($I(1)$).
- There is a long-term relationship between tourism revenue and both total tourist arrivals, total tourist nights, and the number of tourism employees.

- The tourism profitability equation exhibits structural stability, as evidenced by the CUSUM test, indicating that the estimators remain constant over time.
- The independent variables (TTN, TTA, NTE) explain a significant portion of the variation in the dependent variable (TR), as reflected by the high coefficient of determination (97.6%). This suggests that tourism returns are highly sensitive to the evolution of these explanatory variables, and the causal relationship is valid, as the Durbin-Watson statistic (3.2) is greater than the coefficient of determination.
- The model demonstrates the ability to correct errors through the long-term error correction model (UECM).
- There is no issue of autocorrelation in the residuals, and the absence of heteroscedasticity further supports the model's validity.
- Notably, the fixed constant in the estimated equation is significantly estimated at 7.47, a value larger than the other estimators, suggesting that there may be other explanatory variables not included in the model.

IV- Conclusion :

This study assessed and analyzed the profitability of the tourism sector in Algeria over the period 2000–2023. It began by examining Algeria's tourism potential, followed by an evaluation of the sector's performance during the study period. Ultimately, the study concluded by estimating and testing a standard model using the ARDL approach.

IV-1- Results of the study: The following was concluded :

- The tourism sector contributes a relatively small share to the Algerian economy, accounting for at most only 4% of GDP. Additionally, the sector's trade balance has consistently recorded negative rates from independence to the present day.
- There is a positive relationship between tourism revenue (TR) and total tourist nights (TTN), indicating long-term tourism development. The estimated coefficient for TTN is 1.177, meaning that an increase of one tourist night results in a 1.177-point increase in tourism revenue. This finding aligns with theoretical concepts suggesting that an increase in tourist nights leads to higher investment rates in the tourism sector, which in turn boosts the domestic product generated by tourism. However, the effect is relatively weak compared to other variables influencing tourism revenue growth, confirming the **validity of the initial hypothesis**.
- An inverse relationship exists between tourism employment and the growth rate of tourism revenue. Specifically, an increase of one worker in the tourism sector results in a decrease in tourism revenue by 1.429 points. This contradicts economic theory, which posits that a higher tourism employment index reflects increased investment in the tourism sector, leading to higher inbound tourism and a subsequent rise in tourism revenue from foreign currency. This suggests the **invalidity of the second hypothesis**.
- There is a positive relationship between the number of incoming tourists and the growth of tourism revenues. An increase of one incoming tourist results in a 0.905-point rise in tourism revenue. This indicates that a higher volume of incoming tourists contributes to an expanded flow of hard currency into the country through the tourism sector.

IV-2- Study recommendations: The study recommends :

- There is a need to adopt a balanced tourism policy, both in terms of the quantity and quality of tourist facilities, while also aligning with international classification standards to enhance the competitiveness of Algerian tourism.
- A reassessment of the price subsidy policy is necessary, as it negatively impacts the profitability of the tourism sector, particularly given that all materials used in tourism services are imported.
- It is essential to continue with tourism orientation programs, which can influence investment decisions and increase the attraction of investors to the sector. This, in turn, would lead to higher tourism revenues and the creation of additional jobs within the tourism industry.

V- Sources and references:

1. Omar Azzawi, Rania Idir (2019): *The role of the tourism sector in supporting the performance of the national economy in Algeria*. *Journal of Economics and Human Development*, *Journal of Economics and Human Development*, Vol.11, Algeria.
2. Bendjouad M (2019): *Examining the Impact of Agricultural Finance Policy on Agricultural Development in Algeria*, *Journal of Economic Researcher*, Volume: 7, Issue: 11, Algeria.
3. Khantar Nawal, Kalash Abdallah (2019): *Evaluating the performance of the Algerian tourism sector under the Tourism Development Directive Plan (2030 SDAT): A comparative study with a group of Arab countries*, *Journal of Economics and Finance*, Volume:5, Issue:1, Algeria, 2019.
4. *The official website of the Algerian Ministry of Tourism*: www.mta.gov.dz on 02/01/2023.
5. *World Bank data*: www.donneesmondiales.com on 02/01/2023.
6. *MLJSGlobal Travel & Tourism*: <https://wttc.org/> on 31/12/2022.
7. Orley Ashenfelter, Philip Levine (2005): *Statistics and Econometrics : Methods and Applications*. Wiley, edition 1.
8. M. Hashim Pesaran, Y.S. (2001): *Bounds testing approaches to the analysis of level relationships*. *Journal of applied Econometrics*.
9. Narayan, P. (2005): *The saving and investment nexus for china: evidence from cointegration tests*. *Journal of applied economics*.