

# Determinants Shaping the Development of Tourism in Algeria in the Context of Digital Transformation: A Time-Series Study for the Period 2000–2024

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## Abstract:

This study aims to analyze the determinants of tourism development in Algeria during the period 2000–2024, focusing on the impact of digital transformation and hotel infrastructure, using the Autoregressive Distributed Lag (ARDL) model, with the number of tourist arrivals as the dependent variable, and the percentage of Internet users, mobile phone subscriptions, and hotel capacity as explanatory variables. The results of the bounds test revealed a long-run equilibrium relationship among the variables, and diagnostic tests confirmed the model's validity and stability. The results showed that the level of digitization has a negative effect on the number of tourist arrivals in the long run, while its effect is positive and delayed in the short run. It was also found that mobile phone penetration has no significant effect in the long run, though it does have a negative effect during certain short-run periods. In contrast, hotel capacity had a positive and significant effect in both the short and long runs and was the most consistent determinant. The study concluded that digitization alone is not sufficient; rather, it must be transformed into an integrated digital tourism ecosystem that supports marketing, booking, and electronic payments, in parallel with the development of accommodations and services, the improvement of content targeting international markets, the enhancement of the tourist experience, and the boosting of tourism competitiveness.

**Keywords:** digitization, technological innovation, tourism, Algeria

## 1. Introduction:

The tourism sector is one of the most important economic sectors globally, contributing to economic growth, job creation, regional development, and increased foreign exchange earnings. This sector has regained momentum after the repercussions of the COVID-19 pandemic, with the number of international tourists reaching approximately 1.4 billion in 2024, representing a recovery of nearly 99% of pre-pandemic levels. By 2025, this

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number is projected to reach approximately 1.52 billion, reflecting tourism's ability to reclaim its role as an engine of global economic activity (Stephen, 2025; UN Tourism, 2026). At the same time, international reports indicate that the future competitiveness of the sector is increasingly linked to the ability of tourist destinations to adopt innovation and digital technology, and not solely to their natural and cultural assets.

The literature confirms that the rapid development of information and communication technologies has fundamentally transformed the tourism industry, reshaping various links in the tourism value chain, from information retrieval and trip planning to online booking and digital marketing, and finally to managing the tourist experience and customer relationships. This has led to the emergence of the concept of e-tourism as the framework that integrates technology into various tourism activities (Buhalis& Law, 2008; Buhalis& O'Connor, 2005).

With the acceleration of the digital revolution, the literature has known a shift from the concept of e-tourism to that of smart tourism, which is based on the integration of digital infrastructure, big data, smartphones, the Internet of Things, cloud computing, and artificial intelligence. This integration allows for an improved tourist experience, enhanced destination management efficiency, and the creation of added value for all stakeholders in the sector (Gretzel, Sigala, Xiang, & Koo, 2015; Buhalis, 2020). Recent reviews also confirm that digital transformation is no longer simply a matter of using new technologies, but rather a process of institutional and strategic transformation encompassing business models, governance, innovation, and the integration of technological systems within the tourism and hospitality sector (Buhalis, Efthymiou, Uzunboylu, & Thrassou, 2024; Gretzel, 2025).

This transformation has led researchers to focus on studying the impact of digitalization on tourism performance. Numerous studies have shown that the spread of the internet, the increasing use of smartphones, and the development of digital infrastructure have contributed to improved access to tourism markets, reduced transaction costs, increased efficiency in tourism marketing, enhanced service quality, and a stronger competitiveness for tourist destinations. However, the degree of this impact varies depending on the level of digital development, the quality of institutions, and the economic environment of each country (Buhalis& Law, 2008; Buhalis, Efthymiou, Uzunboylu, & Thrassou, 2024).

Despite this notable development in the literature, most applied studies have focused on developed economies or major tourist destinations, while evidence related to developing countries, particularly Arab countries, remains relatively limited. Furthermore, the results of studies on the impact of digital transformation on tourism performance indicators are not uniform, which opens the door for further applied studies that take into account the specific characteristics of these economies and their varying levels of digital readiness. For example, Algeria, which possesses diverse natural and cultural tourism assets, sees its tourism sector's contribution to the national economy fall short of its potential. Despite efforts to develop digital infrastructure, improve communication services, expand internet access, and launch digital transformation programs, applied evidence related to the economy remains limited, especially concerning measuring the long-term and short-term impact of digital transformation indicators on tourism development using dynamic econometric models. The disparity in the results of previous studies and the different economic environments in which they were conducted make it difficult to generalize their findings to the Algerian context, raising questions about the nature of the relationship between digital transformation and the development of the tourism sector in Algeria.

Therefore, the problem addressed in this study is answering the following main question:

**To what extent does digital transformation contribute to explaining the development of tourism in Algeria during the period 2000–2024?**

This main problem leads to the following sub-questions:

- Is there a long-term equilibrium relationship between digital transformation indicators and the development of tourism in Algeria?
- What is the impact of technological diffusion and the level of digitization on the development of tourism in Algeria in both the short and long term?
- Does the development of hotel infrastructure contribute to boosting tourism activity?

Based on this problem, this study aims to analyze the impact of the determinants of digital transformation on the development of tourism in Algeria during the period 2000–2024, by constructing a standard model based on the Autoregressive Distributed Lag (ARDL) methodology. This allows to study the long-term and short-term relationships between the variables. It also aims to assess the role of internet penetration, mobile phone subscriptions, and hotel infrastructure in explaining the evolution of tourism activity, thereby contributing to the development of benchmark evidence that can be used to inform policies aimed at enhancing the competitiveness of the tourism sector in the digital age.

The scientific contribution of this study lies in three main aspects. First, it provides a modern benchmark of the determinants of tourism development in Algeria, based on data extending to 2024, a period not adequately addressed in previous studies. Second, it employs the ARDL model, which allows for the differentiation between short-term and long-term effects, thus providing a more precise understanding of the nature of the relationship between the study variables. Third, it contributes to enriching the literature related to developing economies through presenting findings that can benefit policymakers in designing more effective strategies for integrating digital transformation into tourism sector development plans.

## 2. Theoretical Framework and Literature Review

Over the past two decades, economic and tourism literature has shown increasing interest in studying the effects of digital transformation across various economic sectors, particularly the tourism sector, which is among the most affected by technological advancements. The widespread adoption of information and communication technologies, the development of the internet, smartphones, cloud computing, big data, and artificial intelligence have led to fundamental shifts in the production, marketing, and consumption of tourism services. This has given rise to new concepts such as e-tourism and smart tourism, and has reshaped the competitiveness of tourist destinations. Therefore, analyzing the impact of digital transformation on tourism development requires understanding the key concepts and theories that form the intellectual foundation of this field, which will be addressed in the following sections.

### 1.2. Theoretical Literature

Before reviewing the studies, it is necessary to define the fundamental concepts upon which the research is based.

#### 2.1.1. The Concept of Digital Transformation:

Digital transformation refers to the process of employing digital technologies to redesign processes, activities, and business models in a way that improves operational efficiency, support innovation, enhances service quality, and creates added value for organizations and customers. Digital transformation is not limited to adopting technology or digitizing traditional procedures; rather, it represents a strategic shift affecting various aspects of the organization, including management methods, decision-making, data management, and customer relations (Vial, 2019; Verhoef, et al., 2021). In the tourism sector, digital transformation encompasses the use of the internet, smartphones, cloud

computing, artificial intelligence, big data, and the Internet of Things to develop tourism services and improve the tourist experience, thereby enhancing the competitiveness of tourism establishments and destinations (Gretzel, Sigala, Xiang, & Koo, 2015; Buhalis, 2020). The preceding definitions make it clear that digital transformation is not merely about integrating modern technologies into traditional processes, but rather a comprehensive strategic shift affecting business models, service delivery mechanisms, decision-making methods, and value creation within organizations. This concept is particularly important in the tourism sector, given its increasing reliance on information and digital interaction between service providers and tourists. Accordingly, this study adopts the concept of digital transformation as an integrated process that utilizes digital technologies to improve the efficiency of the tourism sector and enhance its competitiveness.

### **2.1.2 Digital Transformation and Tourism:**

The tourism sector has undergone a radical transformation as a result of the rapid development of information and communication technologies. Tourism has shifted from reliance on traditional marketing and distribution channels to an integrated digital system based on electronic platforms, search engines, smartphone applications, online booking platforms, and social media. This has led to a reshaping of the tourism value chain, improved information flow among various stakeholders, reduced transaction costs, and faster response times to tourist needs (Buhalis & Law, 2008; Buhalis & O'Connor, 2005). Digital transformation has also enabled tourism establishments to design more personalized services, improve resource management, and enhance their access to international markets, making digital technology one of the most important determinants of competitiveness in the tourism sector (Sigala, 2018; Buhalis, Efthymiou, Uzunboyu, & Thrassou, 2024).

The literature indicates a broad consensus on the pivotal role of digital transformation in reshaping the tourism industry, although it differs in interpreting the magnitude of this impact and the factors that determine it. While some studies confirm that digitalization leads to improved competitiveness of tourist destinations and increased tourist demand, others argue that the benefits of digital technologies remain contingent on the quality of digital infrastructure, the efficiency of institutions, and the readiness of the economic environment. Therefore, measuring the impact of digital transformation should be done in light of the economic and institutional characteristics of each country, which justifies choosing Algeria as a case study for this research.

### **3.1.2 Smart Tourism:**

The continuous development of technology has led to the emergence of the concept of Smart Tourism, which is based on the integration of digital technologies, smart infrastructure, big data, and artificial intelligence, with the aim of improving the tourist experience and enhancing the efficiency of destination management. Smart Tourism is characterized by its ability to provide real-time information, support decision-making, improve service quality, and promote sustainability and innovation in the tourism sector (Gretzel, Sigala, Xiang, & Koo, 2015; Buhalis, 2020). This concept emphasizes that the success of tourist destinations no longer depends solely on the abundance of natural or cultural resources, but is also linked to their ability to utilize digital technologies and develop integrated information systems that support sustainable tourism development. The literature reveals that the concept of smart tourism is a natural extension of the evolution of e-tourism. The focus is no longer solely on digitizing services, but now encompasses building an integrated tourism system that relies on data and smart technologies to enhance the tourist experience and improve the efficiency of destination management. While this concept is widely applied in many developed destinations, its implementation in developing countries still faces challenges related to the level of digital infrastructure, technological investment, and institutional capacity. This makes studying the impact of digital transformation indicators on tourism development in Algeria both a scientific and practical endeavor.

It is clear that digital transformation represents the conceptual umbrella encompassing e-tourism and smart tourism. It reflects a gradual evolution in the application of digital technologies within the tourism sector, from the digitization of tourism services to the development of smart, data-driven, and innovative tourism ecosystems. The literature confirms that this transformation has become a key driver of the tourism sector's development and the enhancement of the competitiveness of tourist destinations. Based on this, the current study relies on this theoretical framework to interpret the relationship between digital transformation indicators and tourism development in Algeria, before reviewing the applied literature that has addressed this relationship and identifying the research gap.

## **2.2. Review of Previous Studies:**

Reviewing previous studies is a fundamental step in any scientific study. It allows for an examination of the most prominent research efforts that have addressed the study's topic, an analysis of their methodologies and results, and an identification of points of agreement and disagreement. This helps to pinpoint the research gap that the current study seeks to address. Given the nature of this study, the literature was organized thematically, classifying it according to its main themes. This allows for a critical analysis of the evolution of scientific knowledge concerning the relationship between digital transformation and the development of the tourism sector, rather than simply presenting it chronologically.

### **1.2.2 Applied Studies on the Impact of Digital Transformation on the Development of the Tourism Sector:**

Over the past two decades, the applied literature has known a growing interest in studying the impact of digital transformation on the development of the tourism sector, stemming from the increasing role of information and communication technologies in improving the efficiency of tourism services and enhancing the competitiveness of destinations. Most studies agree that digital transformation has contributed to reshaping tourist behavior, developing tourism business models, and improving the performance of tourism establishments by facilitating access to information, simplifying booking and electronic payment processes, and enhancing digital marketing channels (Buhalis & Law, 2008; Buhalis, 2020). In this context, a study by Buhalis & Law (2008) demonstrated that integrating information and communication technologies into tourism activities has improved the efficiency of tourism establishments and their ability to respond to market needs. It has also contributed to enhancing the competitiveness of tourist destinations by developing electronic communication and distribution channels. Similarly, Sigala (2018) confirmed that digital transformation is no longer limited to improving operational processes but has become a key factor in restructuring the tourism system and creating innovative business models based on data and digital platforms. This has contributed to improving the value offered to tourists and enhancing the sustainability of the tourism sector.

Within the framework of recent developments, studies have shown that digital transformation is now closely linked to the concept of smart tourism, which relies on employing big data, artificial intelligence, and the Internet of Things to develop tourism services and improve the tourist experience. In this regard, a study by (Gretzel, Sigala, Xiang, & Koo, 2015) concluded

(Gretzel, Sigala, Xiang, & Koo, 2015) that building smart tourism systems contributes to increasing the efficiency of destination management and improving service quality. Meanwhile, (Buhalis, 2020) explained that the evolution from e-tourism to smart tourism represents a qualitative shift in tourism sector management, where technology has become a strategic element in achieving innovation and enhancing competitiveness, rather than merely a tool to assist in service delivery.

These studies, despite their differing methodologies and application environments, indicate a broad consensus on the positive impact of digital transformation on tourism sector development. However, most of them focused on

interpreting this impact from a conceptual perspective or on the experiences of advanced economies. There remains a need for more standard studies that examine this relationship in developing countries, taking into account the specificities of their economic environments and levels of digital readiness. This is what the current study aims to contribute to.

### **2.2.2 Applied Studies on the Impact of Digital Transformation Indicators on Tourism Performance**

Recent applied studies have focused on measuring the impact of information and communication technology (ICT) indicators, such as internet penetration, mobile phone subscriptions, and broadband access, on explaining the development of tourism activity. These studies have relied on various econometric models and across diverse economic environments. The majority of these studies have concluded that the development of digital infrastructure contributes to boosting tourism demand, although the strength of this impact varies depending on the level of economic development and digital readiness of countries.

In this context, Kumar (2020) conducted a study on nine major tourist destinations during the period 1995–2017 using the Pooled Mean Group (PMG) model. The study aimed to analyze the impact of mobile phone and broadband subscriptions on international tourism demand. The results showed that an increase in mobile phone and broadband subscriptions is significantly associated with an increase in the number of international arrivals. Furthermore, causality testing revealed a causal relationship extending from ICT indicators to tourism demand, supporting the hypothesis that the development of digital infrastructure is a driver of tourism growth.

Lee, Chen, Wu, and Xing (2021) also presented international evidence using data from 118 countries between 2006 and 2017 and the Panel Quantile Regression methodology to measure the impact of a range of information and communication technology (ICT) indicators on tourism development. The results showed that increased mobile phone subscriptions, secure internet servers, and fixed broadband connections positively affect the number of international tourists, with the magnitude of the impact varying among countries according to their levels of tourism development. This suggests a non-linear relationship between digitalization and tourism development. The study also indicated that developing countries reap greater benefits from investments in digital infrastructure when their institutional readiness improves.

In a more recent study, Sanju N., Yap, Saha, & Rahman (2025) analyzed data from 123 countries between 1995 and 2020 using Dynamic Panel Models (GMMs) to examine the role of digitalization in tourism development. The results confirmed a positive and significant impact of digitalization on tourism development. Mobile phone subscriptions were found to be among the most influential indicators of tourism demand, particularly in developing countries. This reflects the growing role of digital technologies in improving connectivity between tourist destinations and visitors and promoting the expansion of tourism activity.

This empirical evidence indicates a broad consensus that improving digital infrastructure, represented by the spread of the internet and mobile communication services, contributes to supporting tourism performance and increasing the competitiveness of tourist destinations. However, the results also show that the magnitude of this impact is not constant but is influenced by the level of economic development, the quality of digital infrastructure, and the

efficiency of the institutional environment. This highlights the importance of testing this relationship in the Algerian context using time series data and the ARDL model, which is what the current study aims to achieve.

### 3.2.2 Applied Studies in Developing Countries and the Algerian Case:

Despite the significant increase in studies addressing the impact of digital transformation on the tourism sector, applied evidence related to developing countries remains limited compared to studies conducted in developed economies. The results of these studies indicate that leveraging digital transformation to support tourism activity depends not only on the widespread adoption of information and communication technologies (ICTs), but also on the quality of digital infrastructure, institutional efficiency, and the readiness of the economic environment. This explains the variation in results from one country to another.

In the Algerian context, a study by Bichari&Fayak (2024) examined the impact of ICT adoption on the tourism sector during the period 1992–2022 using the ARDL model. It concluded that technology indicators have a positive and significant impact on the development of the tourism sector, emphasizing that improving digital infrastructure can contribute to revitalizing tourism activity and enhancing the efficiency of tourism services.

Conversely, other studies have focused on diagnosing the current state of tourism digitalization in Algeria and the challenges it faces. A study by Mohsen &Belhimer (2023) revealed that digital transformation efforts in the tourism sector are still in their early stages, and that the limited availability of digital services and e-marketing are among the most significant factors hindering the competitiveness of Algeria as a tourist destination. Similarly, a study by Sekak&Ghattas (2024), which examined digital solutions in Algeria's tourism sector by analyzing the current state of digital application and platform usage, concluded that digital transformation is a fundamental pillar for improving the quality of tourism services and enhancing the promotion of Algeria as a tourist destination. This is achieved by facilitating access to information, streamlining booking processes, and improving customer communication. The study also indicated that the utilization of these digital solutions remains limited due to several challenges, most notably the weak adoption of modern technologies by tourism establishments, the inadequacy of e-services, and the need to develop digital infrastructure and enhance human competencies, which contributes to raising the competitiveness of the tourism sector in Algeria.

Algerian literature also indicates that developing digital marketing, expanding the use of electronic platforms, and improving electronic reservation and payment services represent the most important requirements necessary to enhance the competitiveness of tourism institutions and attract tourists. However, achieving these goals still faces challenges related to the digital infrastructure, the integration of electronic services, and the level of tourism institutions' adoption of modern technologies.

In general, applied studies on developing countries, and the Algerian case in particular, reveal a growing interest in studying the relationship between digital transformation and tourism, but most of them have focused on analyzing reality or measuring impact using a limited set of indicators. Hence, there is a need for modern standardized studies that test in an integrated manner the impact of digital transformation indicators, in addition to the determinants of the tourism sector, using a model capable of distinguishing between short-term and long-term relationships, which is what the current study seeks to achieve.

### 3.2 Critical analysis of previous studies and conclusion of the research gap:

It is clear from the review of previous literature that there is broad agreement that digital transformation has become one of the main factors influencing the development of the tourism sector, as most studies have confirmed that improving the digital infrastructure, expanding the use of the Internet, and developing communications services

contribute to enhancing tourism performance and raising the competitiveness of tourist destinations. However, the results of these studies also showed that the size of this effect varies depending on the level of economic development, the quality of the digital infrastructure, and the efficiency of the institutional environment, which explains the discrepancy in results between developed and developing countries.

Despite the scientific importance of these studies, they reveal a number of aspects that still need further research. On the one hand, a significant proportion of international studies have focused on advanced economies or adopted multi-country Panel data, which may limit the generalizability of their findings to developing economies with different structural characteristics. On the other hand, most Arab and Algerian studies focused on analyzing the reality of digital transformation in the tourism sector or dealt with the impact of information and communication technology using a limited number of indicators, while standard studies that combine indicators of digital transformation and the structural determinants of the tourism sector in Algeria remained limited.

Based on this, the current study is distinguished from previous studies in several aspects: It adopts recent data covering the period (2000-2024), which allows monitoring recent developments in the field of digital transformation. It also combines indicators of digital transformation, represented by the percentage of Internet users and the number of mobile phone subscriptions, and one of the structural determinants of the tourism sector, represented by hotel capacity, within one standard model. In addition, this study employs the Autoregressive Distributed Lag (ARDL) model, which allows for the analysis of short-term and long-term relationships between variables. This provides a more comprehensive understanding of the determinants of tourism development in Algeria and contributes to enriching the applied literature, offering results that can be used in formulating public policies.

#### **4.2 Study Hypotheses:**

Based on the theoretical framework and the results of previous studies, and considering the expected relationship between tourism development and its digital and structural determinants, this study begins with a main hypothesis: that digital transformation is a significant determinant of tourism development in Algeria during the period 2000–2024.

To test this hypothesis, the following sub-hypotheses were derived:

- There is a long-term equilibrium relationship between digital transformation indicators and tourism development in Algeria.
- Technological spreading and the level of digitalization contribute to explaining tourism development in Algeria, both in the long and short term.
- The development of hotel infrastructure contributes to enhancing tourism activity in Algeria. These hypotheses allow for testing the relationship between digital transformation and tourism development by distinguishing between a long-term equilibrium relationship and the short- and long-term impacts of digitization and technological development indicators, while considering the role of hotel infrastructure as a structural determinant supporting tourism activity. These hypotheses will be tested using the Autoregressive Distributed Lag (ARDL) model, which allows for determining the nature of the relationships between the study variables in both the short and long term.

#### **3. Study Methodology and Data:**

The methodology and data used are of fundamental importance in testing the research problem and verifying the hypotheses. The reliability of the results and the accuracy of interpreting the relationships between the variables depend on the suitability of the methodologies used to the nature of the study and the quality and homogeneity of

the data. Based on the nature of the topic and its objectives, the study employs a descriptive approach to provide an overview of the development of tourism, digital transformation, and hotel infrastructure in Algeria during the study period. It uses an analytical approach to interpret the development of these variables and analyze the nature of the economic relationships between them, while an econometric approach is employed to quantitatively test these relationships and verify the proposed hypotheses.

On the normative side, the study relies on the Autoregressive Distributed Lag (ARDL) model, as it is suitable for analyzing the dynamic relationships between variables and testing for the existence of a long-term equilibrium relationship, as well as estimating short- and long-term effects. Accordingly, this section addresses the identification of the study variables, the methods for measuring them, and the sources of data.

The study then presents the standard model formulation and estimation methodology, culminating in the necessary tests to verify the time series stability, model validity, and reliability of the results.

### 3.1. Identifying Study Variables and Data Sources:

This study aims to analyze the determinants of tourism development in Algeria during the period 2000–2024 under digital transformation. It examines the relationship between the development of tourism activity and a set of variables related to technological diffusion and the level of digitalization, as well as hotel infrastructure, which is considered a structural determinant of tourism activity. To achieve this objective, a dependent variable reflecting tourism development was selected, along with three explanatory variables reflecting the digital and structural dimensions under study.

The dependent variable is tourism development, measured by the number of tourists arriving in Algeria. This is one of the most commonly used indicators for measuring the development of tourism demand and the performance of a tourist destination. It is denoted by the symbol (N) and expressed as the logarithm (LN).

The explanatory variables are:

Internet user penetration, as an indicator of the level of digital penetration and access to online services and information, denoted by (I) and expressed as the logarithm (LI); mobile phone subscriptions per 100 inhabitants, as an indicator of the spread of mobile communication technologies, denoted by (M) and expressed as the logarithm (LM); and hotel capacity, which reflects the absorptive capacity of the tourism infrastructure and the sector's ability to meet tourist demand, denoted by (H) and expressed as the logarithm (LH).

Annual data covering the period from 2000 to 2024 was used, providing 25 time observations for each variable. The data were collected from available international and national statistical databases and sources, ensuring the standardization of definitions, units of measurement, and time periods before being incorporated into the standard model. Given the varying scales of the variables, logarithmic transformation will be used for those variables whose nature allows for it. This helps reduce variance, improves the characteristics of the time series, and allows for the interpretation of the variables' coefficients as elasticities.

The selection of these variables is justified by their combination of two fundamental dimensions for explaining the development of tourism in Algeria. The first is the digital dimension, through the spread of the internet and mobile communications, while the second is the structural dimension, through hotel capacity. This selection allows for an assessment of whether the expansion of the digital environment has actually impacted the development of tourism activity, taking into account the capacity of the hotel infrastructure to meet tourist demand.

### 2.3 Specifications of the Standard Model:

Based on the main research problem and its hypotheses, a standard model was developed to measure the impact of digital transformation indicators along with hotel infrastructure, on the development of tourism in Algeria during the period 2000–2024. Tourism development is measured by the number of tourist arrivals to Algeria, while digital transformation is represented by the percentage of internet users and mobile phone subscriptions per 100 inhabitants. Hotel capacity represents the structural dimension of tourism activity. We study this impact in both the long and short term, and in doing so, we confirm the existence of a cointegration relationship between the dependent variable and the independent variables by estimating a suitable standard model.

To study cointegration relationships, we find that the use of these tests is primarily based on the work of Engle & Granger (1987), Johansen (1988, Statistical Analysis of Cointegration Vectors), and Johansen & Juselius (1990). It is known that these works stipulate that the variables used in the cointegration equation must be integrals of the same degree; that is, they are not applicable if the model contains integrals of different degrees. To address this limitation, cointegration testing models and models for estimating long-term and short-term relationships were developed. Autoregressive Distributed Lag Modelling (ARDL) models were developed in the work of Pesaran & Shin (1999, Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis), and later in Pesaran, Shin, & Smith (2001), where autoregression models and distributed lag models were combined. Cointegration is tested according to the ARDL methodology using the Bound Test, which was developed by Pesaran, Shin, and Smith (2001), this methodology, according to its developers, is characterized by its ability to test the cointegration of models containing zero-order  $I(0)$ , first-order  $I(1)$ , or a combination of the two.

In this study, we employ the Autoregressive Distributed Lag (ARDL) methodology due to its numerous advantages and because it is the most recent method enabling us to study the relationship between the dependent variable and the independent variables in both the long and short term.

#### 4. The Standard Study

After defining the theoretical framework of the study, reviewing previous literature, and formulating the problem statement and hypotheses, the applied aspect is tackled in the following.

##### 4.1. Presenting the Proposed Standard Model:

We apply the study to an annual series from 2000 to 2024, using the logarithm of the original values. The ARDL model, as proposed by Pesaran, Shin, and Smith (2001), is formulated as follows:

$$\Delta LN_t = C + \rho LN_{t-1} + \theta LI_{t-1} + \varphi LM_{t-1} + \omega LH_{t-1} + \sum_{j=1}^p \alpha_j \Delta LN_{t-j} + \sum_{j=0}^q \beta_j \Delta LI_{t-j} + \sum_{j=0}^T \tau_j \Delta LM_{t-j} + \sum_{j=0}^W \epsilon_j \Delta LH_{t-j} + \varepsilon_t$$

Where  $\rho$ ,  $\theta$ ,  $\varphi$ , and  $\omega$  represent the long-run coefficients,  $\alpha_j$ ,  $\beta_j$ ,  $\tau_j$ , and  $\epsilon_j$  represent the short-run coefficients, and  $p$ ,  $q$ ,  $T$ , and  $W$  represent the time lags of the variables.

##### 4.2. Model Estimation:

We begin by estimating the standard model and testing the nature of the relationship between tourism development, digital transformation indicators, and hotel infrastructure in Algeria during the period 2000–2024.

##### 4.2.1. Time Series Stationarity Test:

Before beginning the estimation process, the stationarity of the time series of the variables must be studied to determine their degree of integration and to ensure the applicability of the ARDL methodology. One of the most important conditions for its application is that the series be integrated of order I (0) or I (1) (Pesaran, Shin, & Smith, 1999, p. 289). To test the unit root, we use the Dickey-Follar Advanced Test (ADF) and the Phillips-Perron Test (PP). The results of both tests are shown below:

- **Determining the Lagging Periods for the Variables**

**Table No. (01): Lagging Periods for the Variables**

| Variable                          | <i>LN</i>  | <i>LI</i>  | <i>LM</i>  | <i>HL</i>  |
|-----------------------------------|------------|------------|------------|------------|
| Number of Lags                    | 2          | 4          | 5          | 3          |
| Variable after the first division | <i>DLN</i> | <i>DLI</i> | <i>DLM</i> | <i>DLH</i> |
| Number of Lags                    | 2          | --         | 2          | 2          |

Source: Prepared by researchers based on the outputs of the (Eviews 12) program

- **Time Series Stationarity Test for Variables:**

The unit root is tested in the three models. The test model is selected from among the three models for each series according to the method of Dolado, Jenkinson, and Sosvilla-Rivero (1990). This method relies on identifying the appropriate model for unit root testing by starting with the longest model (containing both a constant and a time trend) and estimating it based on the appropriate number of lags. The significance of the time trend coefficient is then tested. If it proves to be statistically insignificant, it is discarded, and a simpler model containing only the constant is used. The significance of the constant coefficient is then tested. If it is also insignificant, the simplest model, which contains neither a constant nor a time trend, is used. Statistical tests are employed at each step to ensure the selection of the most suitable model that accurately reflects the nature of the time series without unnecessary complexity. For unit root testing, we use the ADF and PP tests (Phillips and Perron, 1988). The test results are shown in the following table:

**Table No. (02): Results of the unit root test for time series variables**

| Variable | Test | Original Level |        |                | First difference |        |            | Order of Integration |
|----------|------|----------------|--------|----------------|------------------|--------|------------|----------------------|
|          |      | tstatistique   | Proba  | Decision       | tstatistique     | Proba  | Decision   |                      |
| LN       | ADF  | 0.303          | 0.7646 | Non-stationary | -4.387           | 0.0118 | Stationary | <b>I(1)</b>          |
|          | PP   | -2.434         | 0.1434 | Stationary     | -4.598           | 0.0001 | Stationary |                      |
| LI       | ADF  | -9.333         | 0.0000 | Stationary     |                  |        |            | <b>I(0)</b>          |
|          | PP   | -8.841         | 0.0000 | Stationary     |                  |        |            |                      |
| LM       | ADF  | -5.501         | 0.0002 | Stationary     |                  |        |            | <b>I(0)</b>          |
|          | PP   | -4.897         | 0.0007 | Stationary     |                  |        |            |                      |
| LH       | ADF  | -2.392         | 0.3738 | Non-stationary | -5.405           | 0.0002 | Stationary | <b>I(1)</b>          |
|          | PP   | 2.392          | 0.3738 | Non-stationary | -5.546           | 0.0002 | Stationary |                      |

Source: Prepared by the researchers based on the outputs of Eviews 12 software

From the results shown in the table above, it is clear that all series are stationary at the first difference or stationary at the level, meaning they are either zero-order integral  $I(0)$  or one-order integral  $I(1)$ . Therefore, the ARDL methodology can be applied to estimate the relationship between the dependent variable and the independent variables.

#### 4.2.2. Cointegration Test:

To test for cointegration and the existence of a long-term relationship between the independent variable and the dependent variables, we use the Bounds Test. The results are shown in the following table:

Table No. (3): Results of the Cointegration Test according to the Bounds Test

| F value | upper limit | lower limit | Decision               |
|---------|-------------|-------------|------------------------|
| 8.27    | 3.63        | 2.45        | There is cointegration |

Source: Prepared by the researchers based on the output of Eviews 12 software

The table above shows that Fisher's statistic in the bounds test exceeds the upper limit of the critical value at a significance level of 0.05, confirming the existence of a cointegration relationship (a long-term equilibrium relationship) between the dependent variable and the independent variables.

#### 4.2.3. Model Estimation and Statistical Analysis of Results

The Eviews 12 software allows for the automatic determination of optimal lag periods for ARDL models based on numerous criteria. We selected the most important of these, the AIC criterion, to choose the best model, resulting in the ARDL (4,4,4,3) model. The long-term and short-term model estimation results are summarized in the following table:

Table 4: Long-Term and Short-Term Model Estimation Results

| In the long term |                      |             |                   |
|------------------|----------------------|-------------|-------------------|
| Variables        | estimated parameters | t statistic | probability value |
| LI               | -0.522               | -5.444      | -0.0122           |
| LM               | 0.374                | 1.550       | 0.2189            |
| LH               | 0.946                | 9.551       | 0.0024            |
| In the shortterm |                      |             |                   |
| Variables        | estimated parameters | t statistic | probability       |
| D(LN(-1))        | 3.554                | 7.929       | 0.0042            |
| D(LN(-2))        | 2.587                | 6.980       | 0.0060            |
| D(LN(-3))        | 3.205                | 5.844       | 0.0100            |
| D(LI)            | 0.653                | 0.811       | 0.4768            |
| D(LI (-1))       | 7.009                | 6.409       | 0.0077            |
| D(LI (-2))       | 8.027                | 6.366       | 0.0078            |
| D(LI (-3))       | 4.767                | 4.942       | 0.0159            |

|             |        |        |          |
|-------------|--------|--------|----------|
| D(LM)       | -3.082 | -4.595 | 0.0194   |
| D(LM(-1))   | -4.891 | -5.836 | 0.0100   |
| D(LM (-2))  | -1.574 | -2.278 | - 0.1071 |
| D(LM(-3))   | -1.301 | -2.947 | - 0.0601 |
| D(LH)       | 23.953 | 7.140  | 0.0057   |
| D(LH(-1))   | 26.100 | 5.811  | 0.0101   |
| D(LH(-2))   | 14.355 | 3.405  | 0.0423   |
| CointEq(-1) | -4.288 | -8.133 | 0.0039   |

Source: Prepared by researchers based on outputs from Eviews 12 software

The table above shows that changes in the level of digitization in the long run negatively affect the number of arrivals, while they have a positive effect in the short run. The parameter of the variable (LI) is negative and significant in the long run with a value of -0.522 and a probability value of 0.0122, which is less than the significance level of 0.05. Therefore, for every 1% change in the level of digitization, the number of arrivals changes inversely by 0.522%. In the short run, the probability value of the parameter of the two variables, D(LI), is 0.4768, which is greater than the significance level of 0.05, meaning that this effect is not significant. However, a significant effect appears for periods one, two, and three periods later. The probability value of the coefficients of the variables D(LI(-1)), D(LI(-2)), and D(LI(-3)) respectively is 0.0077, 0.0078, 0.0159. With coefficients of 7.009, 8.027, and 4.767 respectively, a 0.1% change in the digitization level in the preceding period leads to a short-term change in the number of arrivals of approximately 7%. Similarly, a 0.1% change in the two and three subsequent periods results in short-term changes in the number of arrivals of approximately 8% and 5% respectively.

-The technology diffusion variable (M) appears to have a non-significant long-term effect on the number of arrivals (N), with a probability value of (LM) is 0.2189. However, it exhibits a significant negative effect in the short term.

Similarly, for a one-period delay, the coefficients of the variables D(LM) and D(LM(-1)) are -3.082 and -4.891, respectively, with probability values of 0.0194 and 0.0100, respectively. Any 0.1% change in the level of technological diffusion in the current period and the previous period leads to an inverse change in the number of arrivals in the short term of approximately 3% and 5%, respectively.

-The results in the table above show that the capacity of hotel establishments, represented by the variable (H), has a significant positive effect on the number of arrivals in both the long and short term. The parameter of the variable (LH) is 0.946 with a probability value of 0.0024, and the parameter of the variable (D(LH)) is 23.953 with a probability value of 0.0057. This means that for every 1% change in the level of technological diffusion, the number of arrivals changes by approximately 0.94% in the long term and by approximately 24% in the short term. Even changes in hotel capacity over one and two periods show a significant positive impact on arrival numbers. The coefficients of the variables D(LH(-1)) and D(LH(-2)) are 26.1 and 14.355, respectively. This means that any 1% change in technological diffusion over the preceding period and the two-period change leads to a short-term change in arrival numbers of approximately 26% and 14%, respectively.

-The table also shows that arrival numbers are positively affected by changes in preceding periods. The coefficients of the variables D(LN(-1)), D(LN(-2)), and D(LN(-3)) are 3.554, 2.587, and 3.205, respectively, with probability values of 0.0042, 0.006, and 0.01, respectively, which are less than the 0.05 function level. The preceding

parameters show that a 1% change in the number of arrivals in the previous period leads to a change of approximately 3.55% in the current period. Changes of 1% in two and three subsequent periods lead to changes in the number of arrivals in this period of approximately 2.59% and 3.2%, respectively.

The table above shows that the error correction coefficient is negative and significant ( $\text{CointEq}(-1) = -4.288$ ), as the probability value is 0.0039. This means that any imbalance in the number of arrivals will be corrected in the long run in less than a quarter of a period.

### 3.4. Model Validity Testing:

To confirm the model's validity, we conduct diagnostic tests to verify its effectiveness and accuracy in estimating the relationship between the dependent and independent variables. This is done by ensuring the consistency of the error variances, confirming that the model does not suffer from autocorrelation between errors, and assessing the model's stability.

• **Test for instability of variance:** Among the tests that diagnose instability of variance, we used the ARCH test, where the null hypothesis states that the variances of errors are equal, and the alternative hypothesis states that the variances of errors are different.

• **Autocorrelation Test for Errors:** Among the tests, we used the LM test, where the null hypothesis states that there is no autocorrelation between errors, and the alternative hypothesis states that there is an autocorrelation between errors.

• **Model Stationarity:** Among the tests, we used the Ramsey-Reset test, where the null hypothesis states that the model parameters are stable, while the alternative hypothesis states that the model parameters are unstable.

• **Normal Distribution of Errors:** We used the Jarque-Bera test, where the null hypothesis states that the errors have a normal distribution. The results of these tests are shown in the following table:

**Table No. (5): Results of Diagnostic Tests for the Model**

| Test                                      | statistics  | statistical value | probability | decision                          |
|-------------------------------------------|-------------|-------------------|-------------|-----------------------------------|
| Non-invariance ARCH                       | F-statistic | 1.945             | 0.1675      | Acceptance of the null hypothesis |
| Autocorrelation of errors LM              | F-statistic | 17.956            | 0.1646      | Acceptance of the null hypothesis |
| Stationarity of the model Ramsey-Reset    | F-statistic | 6.637             | 0.1234      | Acceptance of the null hypothesis |
| Normal distribution of errors Jarque-Bera | Jarque-Bera | 0.599             | 0.7410      | Acceptance of the null hypothesis |

Source: Prepared by the researchers based on the outputs of the (Eviews 12) program

From the results of the table above, we note:

- In the Discretion of Variance test, the probability value of the test is 0.1675 in the F-statistic, which is greater than 0.05, therefore we accept the null hypothesis states that the error variances are equal (constant).

- In the autocorrelation test for errors, we observe that the probability value of the LM test is 0.1646 on the F-statistic, which is greater than the significance level of 0.05. Therefore, we accept the null hypothesis, which states that there is no autocorrelation between the errors.

- In the model stationarity test, it is shown that the model coefficients are stable at a significance level of 0.05, because the probability value of the two F-statistics is 0.1234, which is greater than 0.05. Therefore, we accept the null hypothesis.

- In the normality test, the probability value of the Jarque-Bera test is 0.7410, which is greater than the significance level of 0.05. Therefore, we accept the null hypothesis, which states that the errors are normally distributed.

Based on the results of the previous tests, we can rely on this model to interpret and estimate the effect of changes in independent variables on the dependent variable.

#### 4.5. Analysis of Results

Based on previous findings regarding the impact of digitalization levels, technological penetration, and hotel capacity on tourist arrivals to Algeria during the period 2000-2024, the following results and conclusions were reached:

- The econometric model results showed that the digitalization level variable, expressed as the percentage of internet users in the total population, had a negative impact on tourist arrivals in the long term. This contradicts theoretical expectations and empirical studies in many countries, which often indicate the role of digitalization in enhancing tourism attractiveness. In the short term, the current level of digitalization did not appear to have a direct impact on the development of tourism activity. However, digitalization levels delayed by one, two, and three periods showed a statistically significant positive impact in the short term.

This means that the development of digitalization in Algeria does not immediately translate into direct tourist attraction. Rather, it requires a period of time for its impact on individual tourist behavior to become apparent, whether in terms of researching tourist destinations or making the decision to visit. This aligns with the nature of tourism planning behavior, which is usually based on prior information and the availability of digital content, but all of this occurs in the short term. However, the shift from a positive short-term impact of digitalization to a negative long-term impact can be explained by the disparity in the pace of digital development between Algeria and competing global tourist destinations. The pace of digital transformation in the national tourism sector remains slow and does not keep pace with global digital standards, especially in the areas of e-tourism marketing, the quality of digital promotional content, electronic booking and payment systems, and managing the tourist experience through interactive applications and platforms. Consequently, over time, the initial digital development achieved becomes outdated and lags behind global developments, making the Algerian tourism product appear traditional and unable to compete with the experience of the international tourist, who now relies on advanced, easy, fast, and transparent digital services, as implemented in many global tourist destinations. In other words, Digitalization positively impacts tourism when it develops, but it becomes a deterrent when it stagnates and fails to keep pace with competitors.

This finding, while specific to the Algerian context, shares some similarities with applied literature demonstrating that the relationship between internet use and tourism demand is not necessarily positive and stable across all contexts. For example, Bratić, Petrović, Golubović, and Anđelković (2024), in their study of the impact of internet use on tourism demand in EU countries, found that individual internet use had a negative effect on domestic tourism spending in transition countries, while institutional internet use had a positive effect on tourism demand. This finding is relevant to the current study because it confirms that simply increasing internet use does not necessarily lead to a

positive tourism impact, and that the nature of the user and their level of engagement with the internet also play a role.

The use of technology in tourism can alter the direction of the relationship. The current findings, regarding the temporal dynamics and heterogeneous effects of digitalization, align with the study by Ur Rehman, Liu, Rauf, Ben Slama, and Amin (2020). That study found a long-term and short-term relationship in developed economies, while in less developed economies, the correlation was limited to the short term. This suggests that the ability of technology to generate sustainable tourism impacts varies according to a country's level of economic and digital development. In contrast, the results of the current study differ from several other studies that found a positive and stable impact of the internet or digital infrastructure on tourism. For example, Millia et al. (2023) found a positive long-term effect of the internet on tourist arrivals; their study estimated that a 1% increase in internet use was associated with a 0.49% increase in tourist arrivals in Indonesia.

The technological penetration variable is expressed as the number of mobile phone subscriptions per 100 inhabitants. This number is an important indicator for measuring the extent of smartphone and mobile internet penetration within a society. Theoretically, a high level of this indicator should enhance tourism appeal by facilitating access to tourist information, participation in digital content, and promotion of tourist experiences in Algeria through social media posts, thus encouraging foreign tourists to make travel decisions.

However, the standard results in this study showed that the effect of this variable is not significant in the long term and is negative in the short term, which contradicts the theoretical hypotheses. This can be attributed to the nature of mobile phone use in Algeria and its limited role in influencing foreign tourists. This can be explained by:

- First, the widespread use of mobile phones in Algeria is more localized than international. In other words, usage is primarily directed towards local social networking (such as Facebook, WhatsApp, and TikTok) and not towards producing attractive tourism content tailored to foreign tourists in a language they understand (English, French, or others). Consequently, the digital image of Algerian tourist destinations remains weak and invisible to foreign visitors.
- Second, the absence of reliable official digital tourism platforms through which foreign tourists can view prices, tour packages, hotel bookings, and transportation services means that even if tourists view content about Algeria online, they lack a practical channel to make and execute travel decisions via their smartphones, thus reducing the impact of this variable on visitors.
- Third, on the other hand, the widespread use of smartphones in Algeria allows citizens to easily access competing destinations in countries with advanced digital tourism systems. This leads to Algerian tourism demand being directed abroad, instead of attracting foreign demand to Algeria, which explains the negative impact in the short term.

The spread of mobile phones in Algeria has not translated into a significant influx of foreign tourists because it has not been accompanied by the development of a professional digital tourism infrastructure and content specifically tailored for foreign tourists. Consequently, the variable appears ineffective or even negative in the standard model, despite its theoretical strength.

The findings of the current study, regarding the instability of the statistical impact of technological spread and the fact that mobile phone penetration does not automatically translate into increased tourism demand, partially align with some recent empirical evidence, such as the study by Sanju N., Yap, Saha, & Rahman (2025), which demonstrated that the impact of mobile phone subscriptions on tourism demand was not uniform across all parameters. Although the study's main finding showed a positive and significant effect, robustness tests revealed that the mobile phone subscription coefficient was positive but not significant in some models. Furthermore, there were instances where the statistical effect was not stable, indicating that the relationship between mobile penetration and tourism demand

may be influenced by the measurement method, specification, and sample used. In contrast, the results of the current study differ significantly from those of Kumar & Kumar (2020), whose findings demonstrated that mobile phone subscriptions positively impact the number of international tourist arrivals. This difference reveals that mobile penetration does not necessarily have the same effect across different contexts. The current study indicates that the high number of subscriptions in Algeria has not translated into a sustainable attraction for international tourists, as the effect was not significant in the long term and was negative in some short-term dynamics. This difference can be explained by variations in the level of mobile communications integration within the tourism sector, the nature of the target markets, the level of development of digital services and platforms, as well as differences in the nature of tourist destinations, the sample, and the standard methodology employed.

Therefore, the Algerian result does not imply that mobile phones themselves lack the capacity to support tourism. Rather, it indicates that the quantitative spread of mobile communications is insufficient to transform it into a competitive advantage for tourism unless it is accompanied by the effective use of this technology in international tourism marketing, the provision of information and digital services, electronic booking and payment, and the enhancement of digital interaction with foreign tourists.

- The standard results showed that the variable of hotel capacity (number of beds or reception capabilities) exerts a significant positive influence on the number of tourist arrivals to Algeria in both the short and long term, with a more pronounced effect in the short term. This can be explained by the reality of the tourism sector in Algeria, where accommodation remains central to the tourist experience. The greater the capacity and the higher the quality of hotel services, the greater the ability to accommodate a larger number of visitors and absorb tourist flows during peak seasons, especially in coastal and desert regions with high tourist appeal.

In contrast, Algeria has suffered for years from a significant shortage of modern hotel facilities and a lack of diverse accommodation options, particularly in areas with substantial natural resources such as the vast southern regions and mountainous areas. This has led to recent investment efforts focused on renovating existing hotels and constructing new facilities, which have had a rapid impact on visitor numbers in the short term. In the long term, however, continued improvement in accommodation will contribute to enhancing Algeria's tourism image and increasing its regional competitiveness. While improving capacity is a key factor in attracting tourists, it remains insufficient on its own unless linked to an integrated tourism services system encompassing transportation, entertainment, marketing, and digitalization.

This finding aligns with Petrevska (2013), who emphasized the importance of hotel capacity in meeting tourist demand. Conversely, some evidence suggests a possible inverse or reciprocal relationship. A study by Chen & Lin (2013) found that the evolution of demand and the uncertainty surrounding it can drive hotels to expand their capacity. Therefore, the current result should not be interpreted as a one-way causal relationship, but rather as a balance between tourist demand and hotel capacity. Expanding capacity is thus an important factor for the development of Algerian tourism, but it still needs to be integrated with service quality, transportation, marketing, and digitalization to ensure a sustainable impact on tourist flows.

- The standard results indicate that the number of arrivals during the three previous periods has a significant positive influence on the number of arrivals in the current period. This can be explained by a cumulative and experiential effect of tourism, where tourists who have visited Algeria act as indirect promoters of the Algerian tourist destination. For many foreign tourists, Algeria is a relatively unknown destination internationally, compared to neighboring or competing countries. Therefore, a tourist's positive experience, whether in terms of natural beauty, diverse climate, or warm local hospitality, becomes a living promotional message that is shared with their social circle through personal recommendations, photos, and social media posts. This type of promotion is more effective than

official marketing campaigns because it is based on trust and the authenticity of the experience. Therefore, it can be said that a sustained influx of visitors over time encourages further influxes, as long as the level of tourist satisfaction remains within acceptable limits. However, it is important to note that the sustainability of this effect depends on the quality of the tourist experience offered. If previous visits are not accompanied by a gradual improvement in tourism services, transportation, and accommodation, this effect may diminish or even reverse over time, becoming neutral or even negative.

Based on these findings, it can be concluded that digital transformation in Algeria did not emerge during the study period as a uniformly oriented determinant of tourism development. The internet indicator showed a positive correlation in the short term and a negative one in the long term, while the impact of mobile phones was insignificant in the long term and negative in some short-term periods. In contrast, hotel capacity emerged as the most consistent and positive determinant in the model.

Therefore, the study's findings do not support the notion that simply increasing digital penetration indicators automatically leads to an increase in tourist arrivals. Rather, they point to the importance of transforming technological penetration into an integrated digital tourism system targeting international tourists. This system should combine digital content, e-marketing, e-booking and e-payment, and easy access to tourism information and services. This interpretation aligns with what Algerian literature has shown regarding the continued challenges faced by tourism establishments in adopting modern technologies and developing digital services and platforms.

## **5. Conclusion:**

This study examined the impact of the level of digitization, technological penetration, and the capacity of hotel establishments on the number of tourist arrivals to Algeria during the period 2000–2024. Based on our findings, it can be concluded that the development of tourism in Algeria is subject to a set of factors involving intertwined technological, service, and behavioral aspects. While hotel capacity has shown a significant and positive impact in both the short and long term, reflecting the pivotal role of accommodation as a key component of the tourism supply chain, neither the level of digitalization nor technological penetration has translated into effective tools for attracting foreign tourists. This is either due to the slow pace of digital transformation in tourism or the fact that technology use is limited to domestic communication and not directed towards international tourists, resulting in an unstable impact that falls short of theoretical expectations.

The results also indicate that tourism in Algeria relies heavily on the "cumulative effect of experience," where tourists have historically served as a natural and effective source of promotion for the destination. This partially compensates for the weakness of official tourism marketing. However, the continuation of this positive effect depends on the quality of tourism services provided and the tourism sector's ability to create satisfying, shareable, and transferable experiences.

The tourism sector's failure to keep pace with the rapid technological transformation in society is widening the expectations gap. Potential tourists are becoming more demanding in terms of digital accessibility, transparency, and service quality, while Algeria's digital tourism infrastructure remains underdeveloped. This transforms technology from a potential attraction into a point of comparison, highlighting the weakness of national tourism competitiveness.

Furthermore, it's important to note that the number of tourist arrivals in Algeria is not solely determined by the variables under study. Other complementary factors also play a role, including: the safety and stability of the destination; the quality of air, sea, and land transport; the diversity of leisure products; price levels compared to

regional alternatives; and the effectiveness of international tourism promotion. Therefore, tourism development requires a comprehensive approach that doesn't focus on one aspect to the exclusion of others.

Based on the findings, the following recommendations can be made:

### Recommendations

- Accelerate the digital transformation of tourism by: establishing official multilingual platforms for booking accommodations, organizing tours, and facilitating electronic payments; producing professional promotional content targeting international tourists instead of impressionistic local content; and integrating technological innovation through tourist companion applications (interactive maps, service guides, and digital reviews).
- Leverage technological advancements as an external attraction tool by: encouraging local content creators to produce tourism content; establishing training programs for tourism operators on digital marketing via mobile devices; and developing professional digital tourism content (photos, videos, virtual tours, and experience stories) specifically targeted at European and Asian markets.
- Enhance and improve accommodation capacity by: encouraging private tourism investment, particularly in the South, the Sahara, and mountainous regions; supporting alternative accommodation models (guesthouses, organized tourist camps, and eco-lodges); and expanding investment in quality hotel infrastructure, especially in the southern and mountainous regions, while promoting alternative accommodation models (tourist houses and local residences).
- Improving the tourist experience from arrival to departure through: simplifying administrative procedures, developing domestic tourist transportation, standardizing prices, ensuring quality and transparency in tourism services, and developing human resources in languages, reception, and cultural communication.
- Adopting an international marketing strategy based on: participating in international tourism fairs, building partnerships with international travel agencies, and promoting Algeria as an authentic, natural, diverse, and uncrowded destination.

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