An empirical examination of the dynamics of tourism, growth, and economic development at a regional level. The colombian departments

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ABSTRACT:

Since the normalization of tourism in Colombia resulting from improved security and the pacification of various regions of the country, increased attention has been paid to the key role of tourism in regional economic development. The objective of this paper is to analyze the relationship between the tourism sector and economic development in Colombia. To examine the dynamic relationship existing between international tourism and economic development, the 33 departments of Colombia are analyzed between 2012 and 2021. The empirical analysis is conducted using non-parametric tools, derived from symbolic time series analysis, based on the notion of economic regime and clustering techniques. This offers a contribution in two aspects: on the one hand, a novel methodology is applied, and, on the other hand, regional-level analysis is performed. A limited mobility of the departments between the different regimes has been observed during this period, indicating the stability of the variables analyzed. The results of the study suggest that the relationship between tourism and economic development differs in the different groups of departments identified, offering evidence of differences within the country. It should be noted that the group of departments with the highest level of tourism displays a high level of economic development and growth.

KEYWORDS: Tourism; economic growth; economic development; regional analysis; dynamic regime.

JEL CLASSIFICATION: R11; O10.

Un examen empírico de la dinámica entre turismo, crecimiento y desarrollo económico a nivel regional en los departamentos colombianos

RESUMEN:

Desde la normalización del turismo en Colombia, resultado de la mejora de la seguridad y la pacificación de varias regiones del país, se ha prestado mayor atención al papel clave del turismo en el desarrollo económico regional. El objetivo de este trabajo es analizar la relación entre el sector turístico y el desarrollo económico en Colombia. Para examinar la relación dinámica existente entre el turismo internacional y el desarrollo económico, se analizan los 33 departamentos de Colombia entre 2012 y 2021. El análisis empírico se realiza utilizando herramientas no paramétricas, derivadas del análisis simbólico de series temporales, basadas en la noción de régimen económico y técnicas de clustering.

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Esto supone una contribución en dos aspectos: por un lado, se aplica una metodología novedosa y, por otro, se realiza un análisis a nivel regional. Se observa una limitada movilidad de los departamentos entre los distintos regímenes durante este periodo, lo que indica la estabilidad de las variables analizadas. Los resultados del estudio sugieren que la relación entre turismo y desarrollo económico difiere en los distintos grupos de departamentos identificados, ofreciendo evidencia de diferencias dentro del país. Cabe destacar que el grupo de departamentos con mayor nivel de turismo presenta un alto nivel de desarrollo y crecimiento económico.

PALABRAS CLAVE: Turismo; crecimiento económico; desarrollo económico; análisis regional; régimen dinámico.

CLASIFICACIÓN JEL: R11; O10.

1. INTRODUCTION

Over recent decades, tourism has become one of the fastest-growing economic sectors worldwide (Meng-Yi Tai & Chao, 2023). In 2022, this economic activity represented 7.6% of the global gross domestic product (7.7 trillion dollars), 9.0% of the global work positions (295 million), and spending by international travelers reached 1.7 trillion dollars, making up 6.8% of the total exportations (World Travel & Tourism Council, 2023).

Tourism has proven to be a major generator of economic growth, creating new jobs, increasing income, stimulating infrastructure development, promoting foreign exchange, and providing tax revenue for the public sector or leveraging other economic areas (Brida et al., 2016; Alcalá-Ordoñez et al., 2023). In addition to tourism's importance as a contributor to economic growth, distinct international organizations (UNWTO, 2018; World Bank, 2019) and scientific studies (Cárdenas-García et al., 2019; Wong et al., 2023), have defended its capacity as a tool to increase the levels of economic development and improve the population's living conditions.

In fact, economic growth and economic development are distinct concepts that are not necessarily related, since greater economic growth does not necessarily imply higher levels of development (Croes et al., 2021). However, economic growth and the income generated may be used to develop policies to improve the population's living conditions (Cárdenas-García et al., 2019). Although initially the increase in Gross Domestic Product (GDP) was considered the traditional objective of public policies, linking macroeconomic objectives to an exclusively monetary measure (Todaro & Smith, 2020), over recent decades, a change in focus has taken place, in which the economic growth perspective is not used exclusively. This new focus includes new objectives that are not necessarily economic in nature, such as education, poverty, health, or inequality. Together with the economic criteria, they may serve as a foundation to measure a country's prosperity in a broader manner (Lee, 2017).

In the case of Colombia, tourism is considered to be a strategic economic activity with the potential to promote economic growth and development. Since 2005, this region has experienced sustained growth (Zapata-Aguirre et al., 2020), with tourism becoming one of the country's main economic activities, after the energy mining sector, and before coffee (Garavito et al., 2019). However, some major differences exist within the country as a whole (Rodríguez-Benavides & Ceballos-Mina, 2022).

Regarding the characterization of tourism, Colombia is a country that is divided politically into 33 departments, each of which is considered to be a region having a unique combination of natural, cultural, and historical resources and attractions that represents a diversification of the tourist offer. The arrival of tourist flows to each of these departments and/or regions, has been an uneven process, given that, except in the case of small island states and microstates, the development of tourism occurs at a regional level (Calero & Turner, 2020). Furthermore, these departments display major differences in terms of their level of progress (Sanabria-Gómez, 2017) or socio-economic development (Galvis-Aponte & Meisel-Roca, 2011).

Although tourism has emerged as an important source of income and improvement of development conditions, little empirical evidence exists on the regional impacts of tourism in Colombia (Sanguinet et al., 2020). In fact, although it has been shown that this sector may contribute approximately one-third of

the growth of the country's overall GDP (Brida, et al., 2017), very little empirical evidence exists on the impact of tourism in the regions of Colombia. The few works that do exist tend to rely on qualitative measures, as is the case with Hernández-García (2013) and Rozo-Bellon & Garavito-González (2014), or they analyze other aspects of tourism activity such as competitiveness (Rodríguez-Victoria et al., 2017).

Therefore, it is necessary to understand and measure the impact of tourism activity in Colombia, taking a regional approach, since tourism has become a strategic sector. Tourism is an activity that impacts destinations. Therefore, it is important to move away from a national to a regional level. If data were available, it would also be ideal to consider the tourist destination level. Indeed, except in the case of small island states or micro-states, the impact takes place with major differences at a regional level (Calero & Turner, 2020). Thus, the contribution of tourism from an economic point of view occurs regionally (Bassil et al., 2023), and this is the most appropriate focus of analysis in an empirical analysis.

This justifies the selection of this country and the approach taken for the case study. No relevant empirical work has analyzed the relationship between tourism, economic growth, and development in Colombia, using a regional approach.

Given the gap in the scientific literature regarding the relationship between tourism, economic growth, and economic development with a regional focus, and the lack of relevant studies considering Colombia as a case study, the objective of this article is to detect homogeneous groups of regions having similar dynamic behavior in terms of tourism behavior, economic growth, and level of economic development. It relies on data from the 33 departments of Colombia during the 2012-2021 period and considers the diversity of regions in terms of tourism specialization, growth dynamics, and economic development.

To characterize tourism activity, information is obtained from the Colombian Ministry of Commerce, Industry and Tourism on the arrival of foreign tourists to each of the 33 departments in absolute terms. Growth dynamics are measured with Gross Domestic Product (GDP) at constant 2015 prices, measured in millions of pesos, relativized in per capita terms. Information was obtained from the Colombian National Administrative Department of Statistics (DANE). Finally, the Human Development Index (HDI) is used to characterize economic development, using data provided by the United Nations Development Programme.

For this dynamic analysis, the notion of economic regime was introduced (Brida et al., 2020), and symbolic time series were used (Risso, 2018). This methodology allows for the grouping of regions that have similar behavior, identifying the characteristics of tourism demand and supply associated with greater economic growth and a higher level of economic development.

The work has been organized as follows: the next section provides a review of the main contributions to the literature on the relationship between tourism, economic growth, and economic development, with a special emphasis on the case of Colombia; the third section justifies the selection of Colombia for the case study and indicates the measurement variables used; the fourth section details the methodology used and presents the results; and finally, the last section offers some final conclusions and recommendations for tourism policy.

2. TOURISM, ECONOMIC GROWTH AND ECONOMIC DEVELOPMENT

2.1. A GENERAL OVERVIEW

Given the importance of the impacts derived from the expansion of tourism, specifically, the economic impact of this activity, its influence on economic growth began to be analyzed at the beginning of this century. The pioneer study by Balaguer and Cantavella-Jorda (2002) was the starting point of what is today a global research phenomenon, the study of the Tourism-led Growth Hypothesis (TLGH). Following this initial work on the TLGH, numerous authors have conducted empirical analyses on the relationship between tourism and economic growth, determining that, in general, a one-directional relationship exists, from tourism to economic growth (Brida et al., 2016; Alcalá-Ordóñez et al. 2023).

Following this research line, a second current has arisen that analyzes the relationship between tourism and economic development, whereby tourism may be considered an economic activity that permits the improvement of the living conditions of the host population (Cárdenas et al., 2015). As occurred with the study of the relationship between tourism and economic growth, distinct works have begun to appear in the scientific literature, analyzing the relationship between these variables, although not as extensively as in the prior current. The majority of these studies have found a unidirectional causality from tourism to economic development (Alcalá-Ordoñez & Segarra, 2023).

However, in both of these research streams, a major gap exists in the scientific literature, with few works taking a regional level analysis approach, despite the fact that tourism development rarely occurs uniformly across a country.

2.2. TOURISM AND ECONOMIC GROWTH IN COLOMBIA

Various authors have examined the contribution of tourism to the economic growth of Colombia, generally at a national level, and, to a lesser extent, at a regional or city-wide level.

On the one hand, distinct works have taken a country-level approach; for example, Such-Devesa et al. (2009) quantified the contribution of the tourism sector to the growth of the Colombian economy for the 1990-2006 period. They complemented this analysis with a study of causal relationships between GDP per capita, tourism expenditure in Colombia, and the real exchange rate, drawing conclusions about the importance of the tourism sector on the long-term growth of Colombia's economy. Brida et al. (2009) measured the contribution of tourism to Colombia's economic growth using the Growth Decomposition methodology. They compared their results with those of other surrounding countries such as Argentina, Brazil, Mexico, and Uruguay. Rozo Bellón & Garavito-González (2014) descriptively examined the relationship between tourism and development in Colombia for the 1996-2012 period, concluding that Colombia was experiencing a period in which tourism was beginning to prosper and suggesting that planning would be essential to ensure the success of its tourism policies. Brida et al. (2017) expanded on the growth decomposition methodology using data from the Colombian Tourism Satellite Account to measure the effects of each of the characteristic branches of the tourism sector on Colombian economic growth. Delgado-Munévar (2023) established the relationships existing between economic growth and tourism development in five Latin American countries: Colombia, Ecuador, Guatemala, Mexico, and Peru.

Other works have taken a regional and local approach to the analysis. For example, Brida et al. (2010) measured tourism's contribution to economic growth in the department of Antioquia (Colombia). Brida & Monterubbianesi (2010) analyzed the role of tourism and its effects on economic growth, focusing on four major tourism regions of Colombia. Brida et al. (2020) measured tourism's contribution to economic growth in the city of Medellín for the 2005-2015 period. Sanguinet et al. (2020) used the inter-regional model of input-output to analyze the short-term impact of internal tourism in all of the country's regions, arguing that it may be an efficient mechanism to reduce disparities.

All these studies have revealed the substantial contribution of tourism to the economic growth of Colombia. Indeed, various analyses have shown that tourism plays a significant role at both national and regional levels. Its impact on GDP has been measured, causal relationships with key economic variables have been explored, and its effects have been compared with those of other countries in the region. Furthermore, specific research has been conducted on its influence in distinct regions and cities of Colombia, highlighting its ability to promote local economic growth.

These findings highlight the importance of tourism as an engine of economic growth and suggest its potential as a tool to reduce regional disparities.

2.3. REGIONAL DEVELOPMENT IN COLOMBIA

Various approaches and research areas have been used to study regional economic development in Colombia, although the scientific literature has yet to consider the importance of tourism for development processes.

Some empirical works have revealed the difference in regional development between Bogota and the other departments of the country. For example, Bonet & Meisel (2009) examined regional economic disparities in Colombia by analyzing regional income figures of the country's departments during the 1975-2000 period. They revealed the polarization process arising between Bogota and the other regions since the per capita of this department almost doubles the national average and is more than eight times that of the departments having the lowest income (Choco). Galvis-Aponte et al. (2017) performed an exploratory analysis of the regional figures of economic production in Colombia during the 1975-2015 period, with the results revealing that Bogota has maintained a share of approximately 30% throughout the analyzed years. This figure almost doubles the participation of Antioquia and even exceeds the total of the 23 smallest departments of the country, highlighting the importance and persistence of Bogota as an aggregate value generator at a national level. It also reveals how most of the municipalities having a greater economic richness are situated in the central part of the country.

On the other hand, other empirical work groups have highlighted the existence of factors such as efficiency or geography as being key to the development between regions. For example, Cotte-Poveda (2011) analyzed the economic development and growth in Colombian departments between 1993 and 2007, using the Data Envelopment Analysis (DEA). They used distinct approaches such as poverty, inequality, or security to measure the efficiency of each of the regions, finding that the highest levels of economic activity, quality of life, employment, and security were related to greater efficiency. Peiró-Palomino et al. (2021) offered a composite indicator of well-being for the 33 Colombian departments in 2016, adapting the OECD's Better Life Index at a regional level, including key dimensions such as income, health, education, security, housing, environment, labor market, and civic participation and governance, and applying Data Envelopment Analysis and Multicriteria Decision Making as a methodology. This permitted the comparison of well-being between departments and the creation of rankings, highlighting major disparities in well-being between departments, with population concentration in those with higher levels of well-being. Thus, geography emerged as a relevant factor, revealing a center-periphery duality.

These works highlight the need for policies that address regional disparities and promote more equitable and sustainable development throughout the country. Furthermore, it should also be noted that no research stream addresses the relationship between tourism and regional development in Colombia. This suggests a gap in the research that may be key to an improved understanding of the engines of economic development in different regions of the country.

Therefore, these findings highlight the importance of analyzing the importance of tourism as a tool for economic development.

3. Methodological approach

3.1. A regional case study approach

In Colombia, tourism has been established as a strategic economic activity. In 2022, this country received $7.379 billion USD in foreign currency, the highest figure in its history and surpassing pre-pandemic figures (Office of Economic Studies, 2024).

In 2022, tourism's direct contribution to the Colombian GDP was 31,769,400 million COP (2.3% of the GDP), while the total contribution of tourism to the GDP (including the broader effects of investment, supply chain, and induced impacts on income) was 63,357,300 million COP in this same year (4.5% of the GDP) (World Travel & Tourism Council, 2023).

Compared to other economic activities, tourism ranks second after the mining industry, more specifically, the coal and oil sectors (Garavito & Ochoa, 2016). However, despite these data at a national level, there are major differences in tourism's importance in the 33 departments of Colombia, with the following being the most touristic: Bogota, Bolivar, Antioquia, and Valle del Cauca. Here, the average data on international tourists exceeds 100,000 tourists per year. These four departments, on average, received approximately 85% of the country's international tourists during the 2012-2021 period (Figure 1). The following map of Colombia shows its 33 departments, highlighting the four most touristic ones.

FIGURE 1.
Average annual international tourists by department (2012-2021)

898.308

32
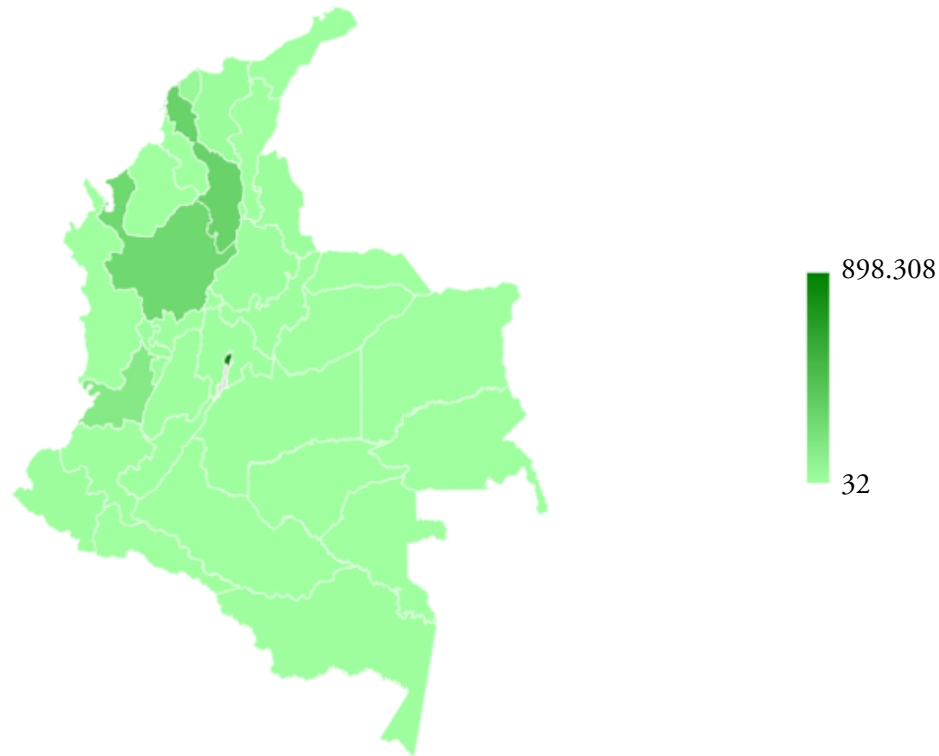
Source: Colombia's Ministry of Commerce, Industry, and Tourism and authors' calculations.

In terms of economic growth, in 2021, Colombia ranked number 98 on Gross Domestic Product per capita at nominal prices, with a total of $6,644 USD (World Economic, 2022), below the world average and those of its neighboring countries of Brazil and Panama. It ranked similarly to countries of its geographical area such as Peru or Ecuador and higher than certain surrounding countries such as Venezuela.

In terms of the measurement of development, Colombia ranked number 88 on the 2021 edition of the Human Development Index (HDI), with a value of 0.752. It was part of the group of countries having a high HDI (UNDP, 2022), above the global average and that of neighboring countries such as Venezuela. It was similar to other countries in its geographical area such as Brazil, Peru, and Ecuador, and was below neighboring countries such as Panama.

In addition to this data at a national level, Table 1 details the situation of each of the 33 departments in terms of economic growth, economic development, and the importance of tourism for the analyzed period.

Between 2012 and 2021, the departments of Casanare, Guaviare, and Meta had GDP per capita values well above the national average, in contrast to departments such as La Guajira, Vichada, and Vaupes, which had values that were much below the average. Likewise, Bogota, D.C stood out for its high Human Development Index, unlike regions such as Vaupes and Guania. Finally, in terms of tourism, Bogota, D.C and Bolivar stand out when compared to the other departments. All of these data reveal the significant regional disparities at an economic, social, and touristic level in Colombia.

Given the importance of tourist activity in Colombia, which justifies its choice as a case study, as well as the expansion of tourist activity, which has revealed major differences at a regional level, the foundations for this research are evident.

TABLE 1.
Descriptive table of the departments of Colombia (2012-2021 average)

Department	Code	GDP	GDP pc	HDI	Population	Tourism
Amazonas	AMA	606	8.09	0.7017	74,821	4,325
Antioquia	ANT	118,366	18.76	0.7596	6,297,991	268,716
Arauca	ARA	4,501	17.63	0.7310	257,243	390
Atlántico	ATL	35,760	14.34	0.7722	2,492,096	48,225
Bogotá, D.C.	BOG	210,699	28.39	0.8008	7,414,992	898,308
Bolívar	BOL	29,354	14.31	0.7421	2,049,820	307,794
Boyacá	BOY	21,969	18.12	0.7472	1,212,296	4,219
Caldas	CAL	12,754	12.79	0.7656	996,801	7,368
Caquetá	CAQ	3,385	8.40	0.7071	402,746	429
Casanare	CAS	12,882	31.50	0.7379	410,394	690
Cauca	CAU	14,507	10.02	0.7091	1,446,024	3,699
Cesar	CES	14,984	12.83	0.7178	1,171,366	2,339
Chocó	CHO	3,509	6.73	0.6847	523,603	1,879
Córdoba	COR	13,890	7.89	0.7033	1,760,824	2,257
Cundinamarca	CUR	49,143	18.02	0.7599	2,743,450	10,523
Guainía	GUA	304	6.64	0.6630	45,938	91
La Guajira	GJR	672	0.79	0.6844	854,883	3,024
Guaviare	GVR	13,498	167.25	0.7413	81,036	41
Huila	HUI	8,572	7.93	0.7145	1,083,418	3,396
Magdalena	MAG	10,818	8.20	0.7153	1,318,863	21,662
Meta	MET	29,405	29.08	0.7620	1,014,167	3,769
Nariño	NAR	12,246	7.54	0.7107	1,623,306	13,610
Norte de Santander	NSA	12,749	8.63	0.7363	1,478,744	17,602
Putumayo	PUT	3,321	9.85	0.7051	338,861	1,019
Quindío	QUI	6,528	12.18	0.7697	535,534	10,925
Risaralda	RIS	12,945	13.81	0.7494	936,110	21,325
S. Andrés and Providencia	SAD	1,265	20.52	0.7773	61,653	74,526
Santander	SAN	52,422	24.32	0.7622	2,155,367	16,236
Sucre	SUC	6,796	7.59	0.7287	893,852	1,005
Tolima	TOL	17,524	13.17	0.7337	1,330,483	4,960
Valle del Cauca	VCA	80,016	17.95	0.7769	4,453,672	148,175
Vaupés	VAU	237	6.02	0.6371	39,330	32
Vichada	VIC	533	5.09	0.7355	104,812	116

Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations.

3.2. Data and variables

In this section, the measurement variables are identified and detailed for each of Colombia's 33 departments, with respect to both tourist activity and economic growth and development. Specifically, the following variables are used:

- Tourism. International tourism is used to characterize tourist activity from a demand perspective, measuring the number of foreigners who, in absolute terms, visit each of Colombia's 33 departments, thereby indicating the degree of a region's tourist activity. This information is obtained from Colombia's Ministry of Commerce, Industry, and Tourism.

- Economic growth. The Gross Domestic Product (GDP) is used at constant 2015 prices, measured in millions of pesos, relativized in per capita terms, such that the GDP of each department is divided by the population making up said region. This information is constructed and obtained from the National Administrative Department of Statistics of Colombia (DANE).

- Economic development. The Human Development Index (HDI) is used to characterize the economic development. It is the average result of the values of three dimensions: education, health, and standard of living. Regional data is provided by the Global Data Lab through an adaptation of national-level data provided by the United Nations Development Program.

For the measurement of both economic growth and the population of each of the departments, longer series could have been obtained, beginning the series in a previous year, as with the use of the HDI, which could have included data from the fiscal year of 1990. However, as for the number of international tourists in Colombia at a departmental level, the first data series are available as of 2012, except for some departments which, in an isolated manner, may have some earlier measurements. Furthermore, the HDI data at a regional level are available until 2021. Therefore, the time series used in this work has a duration of 10 years, the period between 2012 and 2021.

4. Methodology

According to the objective of this work, analyzing the relationship between tourism and economic growth and the relationship between tourism and economic development in Colombia at a regional level, two analyses are presented in parallel in this section. On the one hand, there is a qualitative dynamic analysis between tourism and economic growth, and, on the other hand, there is a qualitative dynamic analysis between tourism and economic development.

Clustering algorithms are used to perform this dynamic analysis. When working with tourism, economic growth and economic development series, which have different units of measurement, the commonly used distance measures are not valid. To overcome this problem, symbolic time series analysis was used (Brida et al., 2020). Thus, starting from the concept of economic regime, in a first step, symbolic series are constructed. This allows moving from two-dimensional time series of tourism and economic growth (or tourism and economic development) to one-dimensional time series of tourism and economic growth, which contain all of the relevant information on the dynamics of these variables. Once the symbolic series are obtained for each department of Colombia, a distance is defined. This distance matrix is used as input, to apply a clustering algorithm, which results in homogeneous groups.

4.1. Symbolization

To capture the qualitatively relevant properties, the concepts of regime and regime dynamics are introduced (Brida et al., 2015; Brida et al., 2020). Each regime corresponds to a model of economic performance that differs qualitatively from the others. The partition of the space of the states of tourism and economic growth/economic development is carried out based on the annual values of the indicator used to measure tourism (x) and economic growth/economic development (y).

Thus, the space is divided into four quadrants, determined by the annual values of the indicator used to measure tourism (x) and economic growth/economic development, $\bar{x}_t$ and $\bar{y}_t$ respectively, with $t = 1, ..., 10$. Based on this division of the space of states in regimes, two types of dynamics are identified: one within each of the regimes and another of change between the regimes. While the dynamics observed in each regime determine a performance model that differs from the models that act in the others, the dynamics of the change from one regime to another indicate where an economy is at each specific moment of time. This dynamic qualitatively describes the performance in terms of tourism and economic growth/economic development.

Regarding the methodological development, in the series symbolization process, the bi-dimensional time series $\{(x_1, y_1), (x_2, y_2), ..., (x_T, y_T)\}$ are substituted by a sequence of symbols: $s = \{s_1, s_2, ..., s_T\}$, such that $s_t = j$ if, and only if (x_t, y_t) belongs to the R_j region. The regimes are defined as follows:

$$R_1 = \{(x, y) : \ x_t \geq \bar{x}_t, y_t \geq \bar{y}_t)\} \tag{1}$$

Regime 1: regions with economic growth/economic development and tourism importance that are higher than the average. In this regime, regions with greater growth or development and with major tourism sector development are expected to be found.

$$R_2 = \{(x, y) : x_t \leq \bar{x}_t, y_t \geq \bar{y}_t)\} \tag{2}$$

Regime 2: regions with high economic growth/economic development and low tourism importance. In this regime, it is expected that there will be some regions having a high level of growth or development, but with specialization in other economic activities.

$$R_3 = \{(x, y) : x_t \leq \bar{x}_t, y_t \leq \bar{y}_t)\} \tag{3}$$

Regime 3: regions with low economic growth/economic development and low tourism importance. Here, it is expected that regions with lower levels of growth or development will be found, as well as a tourism sector that is not very relevant to its economic activity.

$$R_4 = \{(x, y) : x_t \geq \bar{x}_t, y_t \leq \bar{y}_t)\} \tag{4}$$

Regime 4: regions with low economic growth/economic development and high tourism importance. In this region, it is expected that regions with low levels of growth and development and high levels of tourism will be found.

Based on this symbolization, the symbolic distance (the discrete metric of zeros and ones) is defined, and then, based on the constructed distance matrix, a nearest neighbor clustering is made (in this algorithm, the distance between two clusters is defined as the minimum of the element-to-element distances).

4.2. CLUSTERING

In order to detect homogenous groups of regions with similar dynamic behavior in terms of tourism behavior and economic growth/economic development, a cluster of departments was formed. To form this cluster, after obtaining the one-dimensional symbolic series, a metric was introduced to permit comparison of the dynamics of the region and allow for homogenous groups to be obtained. Given two regions, i and j, with symbolic sequences $\{s_{it}\}_{t=1}^{t=T}$ and $\{s_{jt}\}_{t=1}^{t=T}$ the distance between them is defined as follows:

$$d(s_i, s_j) = \sum_{t=1}^{T} f(s_{it}, s_{jt}), \quad where \ f(s_i, s_j) = \begin{cases} 0 \ if \ s_{it} = s_{jt} \\ 1 \ if \ s_{it} \neq s_{jt} \end{cases} with \ t = 1, ..., T \tag{5}$$

Once the distance matrices are obtained in each case, the nearest neighbor method is used to form the clusters (Mantegna & Stanley, 1999).

5. EMPIRICAL RESULTS

5.1. SYMBOLIC TIME SERIES ANALYSIS

Figure 2 shows the point cloud corresponding to the 2012-2021 period, with the respective values of tourism and economic growth (upper panel) and tourism and economic development (lower panel). Each point represents a department for each of the years of the time series (in the first case, tourism and economic growth, and in the second case, tourism and economic development).

FIGURE 2.
Point cloud for the 33 departments (2012-2021)
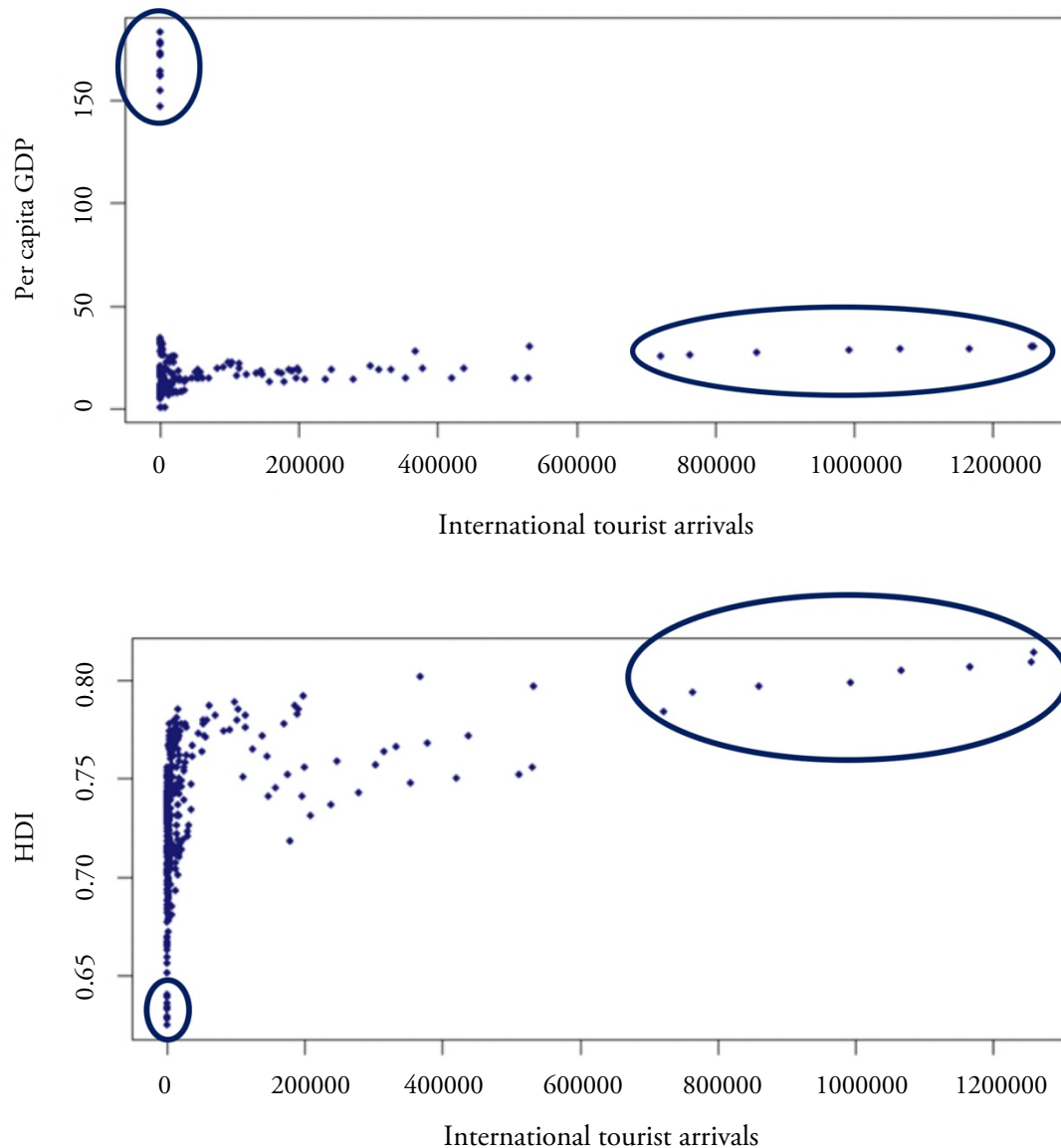
Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations.

In the first part of the figure (tourism and economic growth), there is a large concentration at low levels of both international tourism and economic growth. The points having high GDP per capita

correspond to Guaviare, the only department with a GDP per inhabitant exceeding 150 million Colombian pesos per year. On the other hand, the points having more than 600,000 international tourist arrivals correspond to Bogota, which is the department receiving the most international tourism in Colombia.

In the second part of the figure (tourism and economic development), there is a large concentration around the average level of development in Colombia. The points having a low level of HDI correspond to Vaupes, the only department with an HDI under 0.65. On the other hand, the points with over 600,000 international tourists received correspond to Bogota, as mentioned previously.

Table number 2 shows the percentage of permanence in each regime for each department during the analyzed period, with the left side presenting the relationship between tourism and economic growth and the right side showing that of tourism and economic development.

TABLE 2.
Proportion of permanence of the departments in each regime

Depart-ment	Tourism and economic growth				Tourism and economic development			
	R1	R2	R3	R4	R1	R2	R3	R4
AMA	0%	0%	**100%**	0%	0%	0%	**100%**	0%
ANT	70%	0%	0%	30%	**100%**	0%	0%	0%
ARA	0%	30%	70%	0%	0%	30%	70%	0%
ATL	0%	0%	80%	20%	20%	80%	0%	0%
BOG	**100%**	0%	0%	0%	**100%**	0%	0%	0%
BOL	0%	0%	0%	**100%**	**100%**	0%	0%	0%
BOY	0%	60%	40%	0%	0%	**100%**	0%	0%
CAL	0%	0%	**100%**	0%	0%	**100%**	0%	0%
CAQ	0%	0%	**100%**	0%	0%	0%	**100%**	0%
CAS	0%	**100%**	0%	0%	0%	**100%**	0%	0%
CAU	0%	0%	**100%**	0%	0%	0%	**100%**	0%
CES	0%	0%	**100%**	0%	0%	0%	**100%**	0%
CHO	0%	0%	**100%**	0%	0%	0%	**100%**	0%
COR	0%	0%	**100%**	0%	0%	0%	**100%**	0%
CUR	0%	50%	50%	0%	0%	**100%**	0%	0%
GUA	0%	0%	**100%**	0%	0%	0%	**100%**	0%
GJR	0%	0%	**100%**	0%	0%	0%	**100%**	0%
GVR	0%	**100%**	0%	0%	0%	**100%**	0%	0%
HUI	0%	0%	**100%**	0%	0%	0%	**100%**	0%
MAG	0%	0%	**100%**	0%	0%	0%	**100%**	0%
MET	0%	**100%**	0%	0%	0%	**100%**	0%	0%
NAR	0%	0%	**100%**	0%	0%	0%	**100%**	0%
NSA	0%	0%	**100%**	0%	0%	**100%**	0%	0%
PUT	0%	0%	**100%**	0%	0%	0%	**100%**	0%
QUI	0%	0%	**100%**	0%	0%	**100%**	0%	0%
RIS	0%	0%	**100%**	0%	0%	**100%**	0%	0%
SAD	70%	20%	0%	10%	80%	20%	0%	0%

TABLE 2. CONT.
Proportion of permanence of the departments in each regime

Depart-ment	Tourism and economic growth				Tourism and economic development			
	R1	R2	R3	R4	R1	R2	R3	R4
SAN	0%	**100%**	0%	0%	0%	**100%**	0%	0%
SUC	0%	0%	**100%**	0%	0%	10%	90%	0%
TOL	0%	0%	**100%**	0%	0%	90%	10%	0%
VCA	50%	0%	0%	50%	**100%**	0%	0%	0%
VAU	0%	0%	**100%**	0%	0%	0%	**100%**	0%
VIC	0%	0%	**100%**	0%	0%	70%	30%	0%

Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations.

As seen in the table, the large majority of the departments remain in the same regime throughout the entire period: 26 departments for the case of tourism and growth, 27 departments for the case of tourism and development. Therefore, changes in regime are difficult to find since these changes tend to imply a structural alteration in the economy. Moreover, in a short period of time (such as the period analyzed in this work, which spans 10 years), it would be unusual to encounter this type of structural change.

Furthermore, in both cases, regime 3 (departments with low tourism importance and low levels of growth and development) is the one in which the most departments predominate: 20 departments for the case of tourism and growth, 10 departments for the case of tourism and development. This suggests that, although tourism as an economic activity is important for Colombia, only certain regions of the country specialize in it and use its expansion to channel greater economic growth and improved host population development.

5.2. FORMATION OF CLUSTERS BASED ON TOURISM BEHAVIOR AND REGIONAL GROWTH

5.2.1. TOURISM AND ECONOMIC GROWTH

Firstly, a dendrogram is shown for the grouping of departments displaying similar dynamic behavior in terms of tourism, measured through the number of international tourists, and economic growth, based on the GDP per capita (Figure 3).

From this grouping process, 3 groups of regions are obtained, which share homogenous dynamic behavior in terms of tourism activity. Figure 4 shows the clustered regions sharing a similar behavior and having significant differences with respect to the other homogenous groups.

FIGURE 3.

Dendrogram of clustering of departments between tourism and economic growth
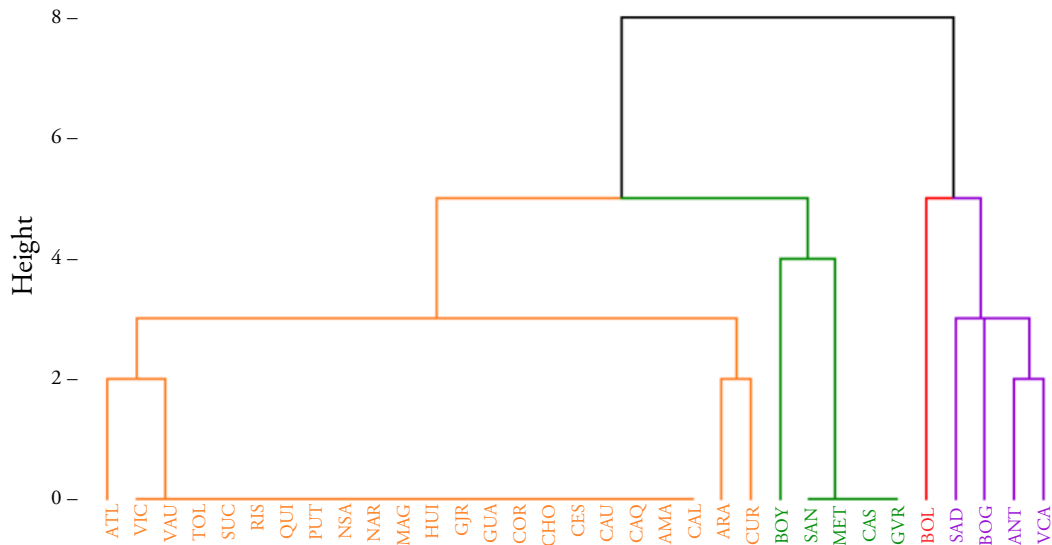
Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations.

FIGURE 4.

Homogenous groups of departments with similar dynamic behavior (tourism – economic growth)
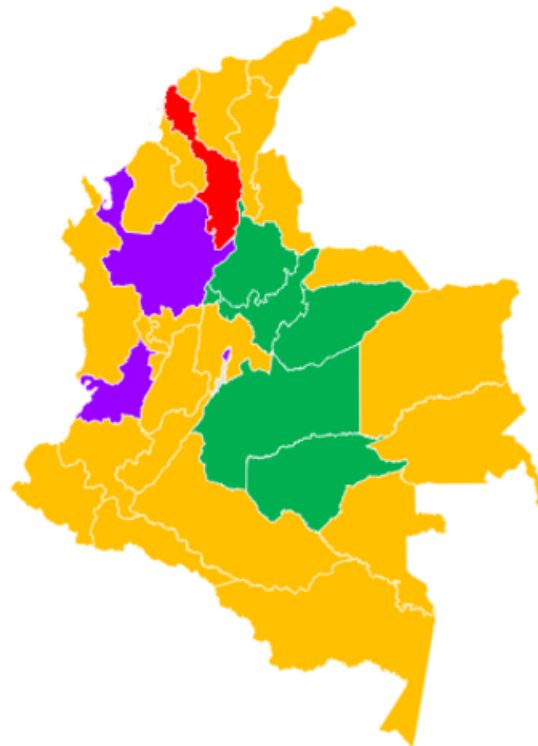
Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations. (Orange: group A / Purple: group B / Green: group C / Red: outliers)

As shown in the previous figure, three main groups exist. They are characterized by the performance of these variables (tourism and economic growth). Bolivar is the only department that is not grouped, that is, that does not connect with any of the other main groups.

Table 3 below summarizes what is shown in the previous map.

TABLE 3.
Homogenous groups of departments with similar dynamic behavior (tourism – economic growth)

| Group A (Orange)	Group B (Purple)	Group C (Green)
Departments with low tourism activity and low GDP levels	Departments with high tourism activity and a high GDP level	Departments with low tourism activity and high GDP levels
23 departments	4 departments	5 departments
Amazonas, Arauca, Atlántico, Caldas, Caquetá, Cauca, Cesar, Chocó, Córdoba, Cundinamarca, Guainía, La Guajira, Huila, Magdalena, Nariño, Norte de Santander, Putumayo, Quindío, Risaralda, Sucre, Tolima, Vaupés and Vichada	Antioquia, Bogotá, San Andrés and Providencia and Valle del Cauca	Boyacá, Casanare, Guaviare, Meta and Santander
These regions are characterized by low numbers of tourists and by not being specialized in other productive activities that would increase their GDP level.	These regions receive a large number of tourists, resulting in their tourism specialization. Thus, high levels of economic growth are generated from the intense economic activity taking place in the regions.	Regions specialize in other productive activities that allow them to attain high levels of economic growth.

Source: Author's own creation.

5.2.2. TOURISM AND ECONOMIC DEVELOPMENT

Second, a dendrogram shows the grouping of departments displaying similar dynamic behavior in terms of tourism, measured based on number of international tourists, and economic development, measured based on the HDI (Figure 5).

From this grouping process, 3 groups of regions sharing homogenous dynamic behavior in terms of tourism activity are obtained. Figure 6 presents the grouped regions displaying similar behavior and significant differences with respect to the other homogenous groups.

FIGURE 5.
Dendrogram of the grouping of departments between tourism and economic development
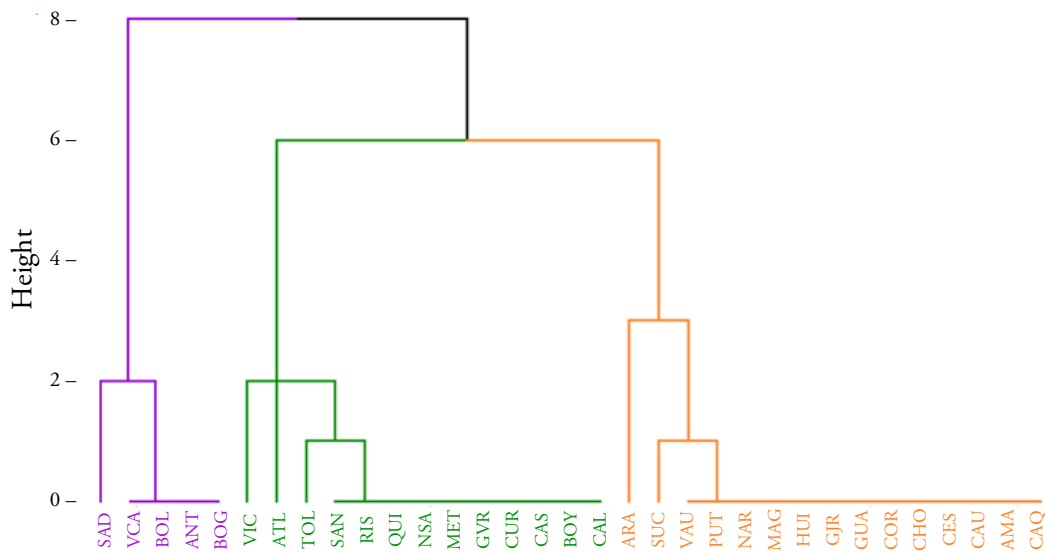
Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations.

FIGURE 6.
Homogenous groups of departments displaying similar dynamic behavior (tourism – economic development)
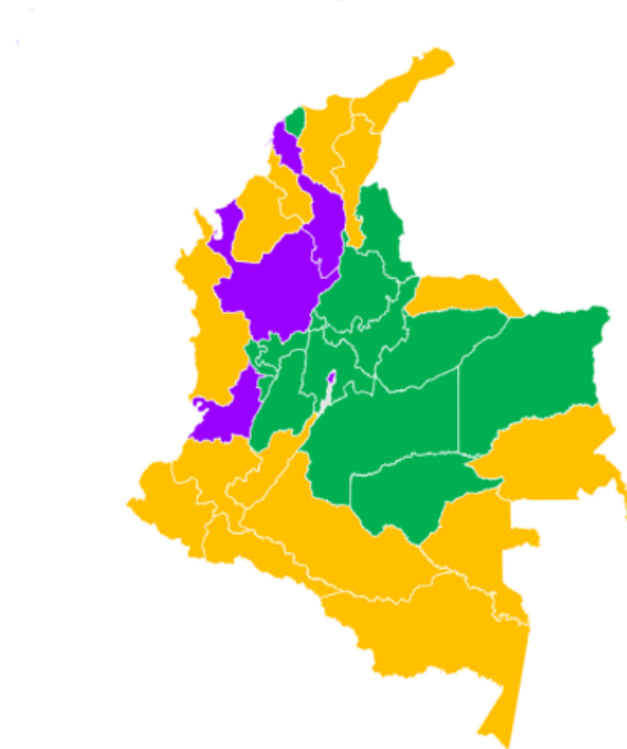
Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations. (Orange: group A / Purple: group B / Green: group C).

As seen in the previous figure, three main groups exist, characterized by their performance on these variables (tourism and economic development).

TABLE 4.
Homogenous groups of departments with similar dynamic behavior (tourism – economic development)

Group A (Orange)	Group B (Purple)	Group C (Green)
Departments with low tourism activity and low GDP levels	Departments with high tourism activity and a high GDP level	Departments with low tourism activity and high GDP levels
15 departments	5 departments	13 departments
Amazonas, Arauca, Caquetá, Cauca, Cesar, Chocó, Córdoba, Guainía, La Guajira, Huila, Magdalena, Nariño, Putumayo, Sucre and Vaupés	Antioquia, Bogotá, Bolívar, San Andrés and Providencia and Valle del Cauca	Atlántico, Boyacá, Caldas, Casanare, Cundinamarca, Guaviare, Meta, Norte de Santander, Quindío, Risaralda, Santander, Tolima and Vichada
These departments are experiencing a developmental trap, given their low levels of development, which hinder the expansion of tourism activity. Simultaneously, this lack of tourism development hinders the improvement of the host population's living conditions.	The tourism specialization of these departments serves as a tool for economic development.	Although tourism is not a fundamental sector of the economy, other economic activities allow the departments to attain high levels of development. .

Source: Author's own creation.

5.2.3. REGIONAL TOURISM CHARACTERIZATION AS A DETERMINANT OF ECONOMIC GROWTH AND DEVELOPMENT

When considering both international tourism and economic growth, as well as international tourism and economic development, 3 groups of departments displaying similar behavior are obtained. However, when altering between economic growth and economic development, their composition differs.

On the one hand, the relationships between tourism and economic growth, as well as the relationships between tourism and economic development, appear to behave quite similarly, given that, of the 33 departments analyzed, group changes only take place in 9 of these (and all in the same direction):

- 8 regions that, when analyzing tourism and economic growth, are part of Group A (low tourism activity and low economic growth levels), but when analyzing tourism and economic development, are part of Group C (low level of tourism activity and high level of development). These departments are: Atlántico, Caldas, Cundinamarca, Norte de Santander, Quindio, Risaralda, Tolima, and Vichada.

- 1 region does not fit into any of the groups when analyzing tourism and economic growth (outlier), but when analyzing tourism and economic development is part of group B (high level of tourism activity and high level of development). This department is Bolivar.

First, it should be noted that a higher level of tourism activity means a higher level of economic growth for the departments, and, most importantly, this economic growth generated by tourism also results in improved living conditions in the resident population and, therefore, a higher level of economic development.

Second, it should also be highlighted that no departments which, having increased their levels of tourism activity, do not display high levels of economic growth and high levels of development. Therefore,

it should be noted that tourism activity is considered a tool of growth and development at a regional level in Colombia.

It would be interesting to characterize these departments in comparison with the other regions, in order to identify the tourism factors that are determinant to achieving higher levels of economic growth and development at a regional level in Colombia (Table 5).

FIGURE 7.
Groups of regions with similar behavior according to economic growth or development
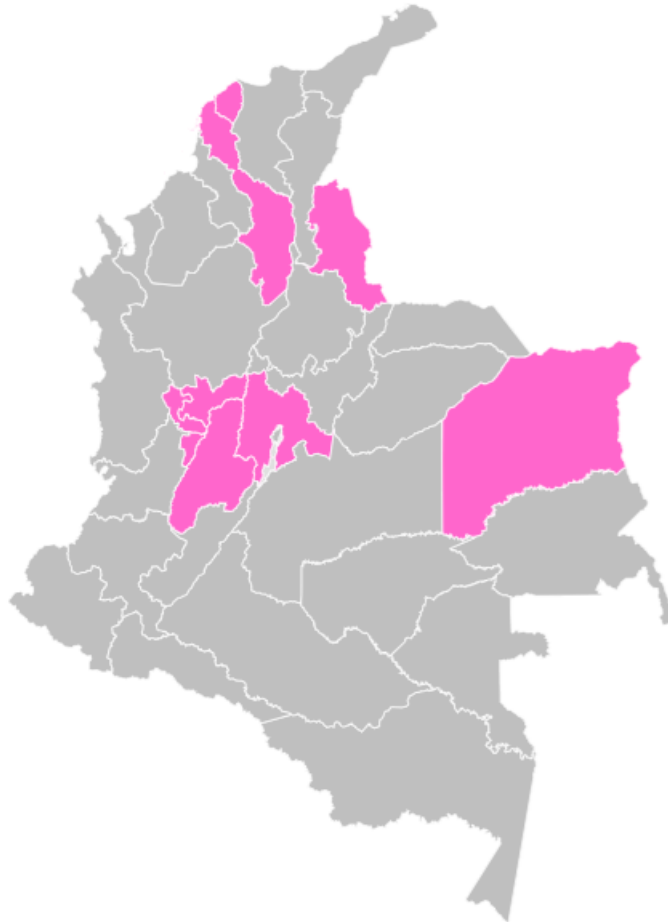
Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations.
(Pink: regions that change regime when analyzing tourism-growth or tourism-development / Gray: regions with no change).

Regarding tourist characterization based on demand data, tourist activity level is relevant for those departments in which tourism represents a higher level of economic growth and development, both in absolute terms (with a difference of 100,000 annual tourists in average terms between the lower limit of the Group B departments and the other departments) as well as in relative terms (a difference of 0.02 tourists per capita between both limits).

As for tourist characterization according to supply data, the number of travel agencies is the only indicator that is relevant for departments where tourism represents higher levels of growth and economic development (with a difference of an average of 155 travel agencies between the lower limit of the Group B departments and the other departments), since both in availability of accommodation (measured by the number of tourist lodging establishments and the number of tourism properties) and dining establishments, departments in Group B do not display higher figures than the other departments.

TABLE 5.
Characterization of regions in which tourism is related to higher levels of economic growth and higher levels of development

B Gr. (high tourism/high growth-development) Bogota, Bolivar[*], Antioquia, Valle del Cauca and San Andres and Providencia [1]	Other regions
International tourism: > 148.000 tourists-year	International tourism: ≤ 48.000 tourists-year
Tourist intensity: > 0.05 tourists pc	Tourist intensity: ≤ 0.03 tourists pc
Travel agencies: ≥ 680 annual mean[1]	Travel agencies: < 525 annual mean
Lodging establishments: > 465 annual mean	Lodging establishments: < 1,075 annual mean
Tourism properties: > 270 annual mean	Tourism properties: < 910 annual mean
Dining establishments: > 70 annual mean	Dining establishments: < 95 annual mean

[*] Although considered an outlier when analyzing tourism and economic growth, it could be grouped at distance 5 with Group B. [1] Although it is outside of the absolute values indicated in some relative indicators (per capita) it has the highest values on those indicators (for example, in tourist intensity, the only one with a value > 1; specifically, 1.21).
Source: Colombia's Ministry of Commerce, Industry, and Tourism; National Administrative Department; United Nations Development Program and authors' calculations.

6. CONCLUSION

This work advances the study of the interaction between tourism, economic growth, and economic development, taking an innovative approach that addresses two fundamental aspects: whether the economic growth generated by tourist activity represents an improvement in development and following a regional-level approach for this type of research. To achieve the objectives, qualitative dynamic analyses have been performed, introducing the concept of regime and the dynamics of regimes in order to differentiate between the qualitatively relevant properties of each of them. Subsequently, a grouping of departments was carried out to detect homogeneous groups of regions displaying similar dynamic behavior in terms of tourist behavior and economic growth/economic development. The techniques used allowed us to understand dynamic and complex processes that may go unnoticed in static analyses, providing guidance for future policies and practices in the field of tourism and regional development.

The relationship between tourism and the dynamics of economic growth and development in Colombia reveals major differences at a regional level. This study has enabled the identification of homogeneous groups of regions displaying similar behavior in terms of tourism and economic growth and in terms of tourism and economic development. Few differences have been observed in both classifications, with minimal changes occurring in the same direction (for example, departments that, despite not being specialized in tourism, present low growth levels but high development levels).

It should be noted that, in all cases, those departments having the highest levels of tourism (Bogota, Bolivar, Antioquia, Valle del Cauca, and San Andres and Providencia) display a high level of economic growth as well as a high level of economic development. Relevantly, there are no exceptions to this result (that is, no departments had elevated levels of tourism and low levels of economic growth or low development levels), suggesting that the expansion of tourism activity may enable economic growth and development at a regional level in Colombia.

The characterization of the Colombian departments made from a tourism perspective reveals that factors related to tourism demand (tourism activity and intensity) are relevant in the Group B regions (those with high tourism and high levels of economic growth and development), whereas the greater provision of factors related to the tourism offer is almost irrelevant.

As for policy recommendations, two fundamental aspects should be highlighted. On the one hand, it is necessary to develop policies related to attracting international tourists to the departments that are less specialized in this activity, since it has been shown that the most touristy regions have high levels of

economic growth and development. On the other hand, policies should be developed to provide resources or attraction factors for tourists, as opposed to policies attempting to increase the complementary tourism offer, given that this is not relevant to the relationship between tourism and economic growth-development.

Limitations of this work include the short time period that was analyzed, due to data availability, and the absence of additional indicators to characterize tourism demand at a regional level: motivation, stay, and tourist expenditure, among others.

Future lines of research could include an econometric analysis to determine the causal relationships existing between the variables examined in this work using qualitative dynamic analysis. It may also be possible to expand upon the characterization of the departments based on other indicators that are not exclusively touristic in nature.

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