The economic impact of the tourism sector on the overall Italian economy:

An Input-Output Approach

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Abstract

Defining the tourism sector poses a considerable challenge, owing to the diversified nature of its economic activities, which encompass services, industries, and agriculture. The extent of tourism's influence varies substantially across these sectors, making it arduous to gauge its contribution to the gross domestic product (GDP). To surmount this challenge, the satellite accounting method (TSA) is typically used to establish the spread of tourism across different economic activities and subsequently determine its contribution to final production. A range of approaches, including impact models, cost-benefit models, social accounting matrices (SAMs), and computable general equilibrium (CGE), have been utilized to evaluate the economic ramifications of tourism (see Frechtling, 2009; Madsen and Zhang, 2010; Rossouw and Saayman, 2011; and Dwyer et al., 2007). However, since 2010, TSAs have become, the standard tool to measure the direct economic contributions of tourism (Cañada, 2013; Dwyer et al., op.cit.).

Within the framework of satellite accounting (TSA), the expenditure approach is typically adopted, although it should not be regarded as the exclusive method. Given that tourism expenditure is the key metric used to determine tourism's contribution to the gross domestic product (GDP) in the satellite accounts, it is essential to ascertain which aggregate is considered within the Italian satellite accounting framework. Other countries' approaches to this matter generally rely on industry data (Structural Business Statistics), input-output tables in the System of National Accounts (SNA), and/or visitor surveys (Pham and Dwyer, 2013). The TSA has the advantage to identify industry outputs that are consumed or purchased for tourism as well as their contribution to key macroeconomic indicators such as GDP, national income, and employment (Frechtling, 2010; Jones et al., 2009).

The relationship between tourism and other economic sectors remains incompletely understood since tourism is not identified as a separate industry in a country's input-output tables. Several studies have investigated the dominant economic activity aggregated in "homogeneous production branches or activity branches," without explicitly distinguishing tourism activity from non-tourism activity, such as in the case of the restaurant industry. The present study seeks to address this issue by considering the tourism industry as it is defined in the Tourism Satellite Accounts and incorporating this classification into the Input-Output (I-O) framework. To achieve this objective, the economic activities pertaining to the tourism industry, as delineated within the framework of satellite accounting, were consolidated within the Input-Output (I-O) tables under the designation of the "tourism sector." In this process, the original economic activities were appropriately weighted by employing the tourism coefficients derived from satellite accounting. Concurrently, the economic activities within the tourism industry that were not directly associated with tourism were encompassed within the non-tourism sector. The latest Input-Output scheme published by ISTAT for the year 2019 was used for this purpose.

To estimate the overall impact of tourism on employment, income, and production by calculating multipliers, it was necessary to first compute technical coefficients for the tourism sector. Subsequently, the study presents forward and backward linkage coefficients to illustrate how variations in the tourism sectors would influence the value-added , production, employment, and income of the entire national economy. This could prove valuable for economic policy planning, particularly for policymakers who seek to measure the impact of the tourism industry on other sectors. However, given that the contribution of the tourism industry to GDP is determined using the expenditure approach, the paper begins by focusing on a preliminary analysis

of discrepancies in data pertaining to tourism spending. This constitutes a key aspect in understanding the quality of the tourism coefficient used to derive the tourism sector in the I-O scheme, and subsequently, the impact of the tourism industry as an industry was calculated by aggregating the activity branches.

Keywords – Tourism GDP, *input-output analysis, tourism Industry, satellite accounts*

1 - Introduction

Tourism expenditure is frequently considered as an exogenous variable both in models that estimate the economic impact of tourism on the economy and in satellite accounting perspectives (UNWTO, 2008; Frechtling and Smeral, op.cit.). However, satellite accounting defines (Pam and Dwyer, op.cit.) the contribution of tourism to the formation of the Gross Value Added of the entire economic system, rather than measuring its impact (Antolini et al., 2022). The latter represents an important tool in evaluating the contribution of tourism to the economy, defining the tourism phenomenon from an economic perspective through the dissemination of ten tables, including the measurement of tourism value added, and domestic consumption (Table 5 and 6). Despite the revision of national accounts with the System of National Accounts of 1993 (SNA '93), reiterated also by the System of National and Regional Accounts (Sec '95), as well as by subsequent revisions of 2008 (SNA '08) and 2010 (Sec '10), satellite accounting continues to not be regulated at the European Union (EU) level. In fact, while the role of tourism in the economic and social development of territories is recognized in EU regulation 692/2011 governing tourism statistics, it is not envisaged that National Statistical Institutes prepare a satellite accounting scheme. This results in a lack of uniformity in the compilation of the ten tables provided by satellite accounting, and only the table "Production accounts of tourism industries and other industries" (Table 5) is compiled by all European countries. The absence of EU regulation results in a lack of exhaustiveness of the indicators contained in the tables and transmitted to Eurostat (Eurostat, 2023 p.8).

The critical issues previously mentioned are more pronounced at lower territorial levels than at the national level. Although regional accounting schemes have been experimentally introduced in some Northern European countries, their implementation remains limited. The common approach used in Italy and many other European countries to measure the contribution of tourism to Gross Domestic Product (GDP) is through expenditure. In national accounting, the value-added method is preferred for estimating the value added of market economic activities, while the personal income or income method is used for non-market activities. In Italy and other countries, the expenditure approach for market economic activities is used to balance economic accounts. This method employs data from household expenditure surveys, which also apply to tourism expenditure collected from travel and holiday surveys (ISTAT, 2019). Therefore, the estimation of tourism expenditure in satellite accounts and in travel and holiday surveys should yield convergent results.

Moreover, tourism expenditure is a strategic variable that is not only useful in determining the contribution or impact of tourism flows on the national and local economy, but also in adequately profiling tourism demand (Figini and Patuelli, 2022; Dwyer, et al., 2020). Different forms of tourism, due to their varying levels of tourism expenditure, have different economic impacts. The analysis of sectoral interdependence (Leontief, 1987) allows for describing the links between different activity sectors and predicting the trend of global demand in relation to other economic sectors. However, Input-Output (I-O) analysis presents limitations for tourism since it is cross-cutting with respect to the NACE Rev.2 classification used for branch aggregation.

The objective of the present study is to compare, in the first part of the research, the estimation of tourist expenditure obtained from the analysis of microdata related to "travel and holiday" with that reported in the satellite accounts (ISTAT, 2022). This variable represents an essential element of both the satellite accounting and the Input-Output schema. In the second part of the study, a methodology is proposed for integrating the original Input-Output schema to determine the impact of tourism on the global economy,

considering the cross-cutting nature of tourism in relation to the Nace Rev.2 classification used for branch aggregation in the Input-Output table (Munjal, 2013; Chou and Huang, 2016).

2 – The tourist expenditure in the household expenditure survey and in the satellite accounts

Regarding the estimation of national tourism expenditure in 2019, the recommended official approach consists of using the satellite accounting (TSA):

"*It is worth noting that the TSA contrasts with the other popular methods of estimating the economic contribution or impact of tourism, such as integrated tourism economic benefit models,* (*regional travel impact models* (Frechtling, 1994), co*mputable general equilibrium models* (Dwyer et al., 2004), *and input/output models* (Fletcher, 1989). *As models, these approaches simulate the impact of visitor spending on business receipts, labor earnings and other income, employment, and tax revenue. The TSA, on the other hand, uses statistical observation organized and reconciled in the form of accounts to document the contribution of visitors to a country's economy*" (Frechtling, 2010).

In the satellite accounting schema, it is important to recall how tourist expenditure is defined:

''*The amount paid for the acquisition of consumption goods and services, as well as valuables, for own use or to give away, for and during tourism trips*'' (IRTS, 2008, p. 35).

In addition, the TSA recognizes ''tourism consumption'' by adding certain elements to tourism internal expenditure, often not requiring exchange of money for products. The Table 1 only reports domestic tourism expenditure as contained in Table 2 of the tourism satellite account for Italy. Additionally, it should be noted that characteristic tourism products are those that:

"*In absence of visitors, would probably cease to exist in meaningful quantity or for which the level of consumption would be significantly reduced and for which it seems possible to obtain statistical information*" (United Nations, 2001 p.38).

Table 1 – Domestic tourism expenditure by product and type of visitor - millions of euros - Year 2019

Products	Tourists (2.1)	Hikers (2.2)	Total visitors (2.3) = (2.1) + (2.2)
Characteristic tourist products	40.714	3.249	43.962
1- Receptive services for visitors	16.438	-	16.438
1.a- Receptive services other than 1.b	13.233	-	13.233
1.b- Receptive services related to the use of second homes owned	3.205	-	3.205
2- Restaurant services	10.042	2.128	12.169
3- Passenger rail transportation services	1.967	71	2.038
4- Road passenger transportation services	1.719	301	2.020
5- Passenger water transport services	2.060	4	2.064
6- Passenger air transportation services	3.542	2	3.543
7- Vehicle rental services	407	25	432
8- Travel agency services and other reservation services	2.911	617	3.528
9- Cultural services	387	24	411
10- Sports and recreation services	1.242	77	1.319
Shopping	8.141	3.209	11.351
Other	13.466	2.810	16.277
Total	62.321	9.268	71.589

Source: ISTAT data processing - Satellite Accounting

The Sna '93 for the first time promoted a certain extension of the national accounts by the ''satellite account'', which is designed to make apparent and to describe with more depth aspects that are hidden in the accounts of the central framework'' (Sna '93 p.51).

The estimation of the macroeconomic indicators reported in the satellite accounts is consistent with the national accounting manual:

"*The Tourism Satellite Account comprises a set of ten interrelated tables consistent with the general supply and use tables established by countries at the national level to describe the general economic balance of goods and services and the production accounts of the producers following the System of National Accounts 1993*" (IRTS, 2008, p. 77).

The national accounts have historically relied on household consumption data to assess the formation of Gross Domestic Product (GDP) through the expenditure method, with the aim of balancing economic aggregates (ISTAT, 2004, p.257). The data for these accounts have been collected through the Household Expenditure Survey, which included a travel and holidays module since 2014. To compare the aggregate estimates of the satellite accounts with those obtained from reworking the micro-data of the Italian household expenditure survey, expansion coefficients are necessary due to the survey's sample-based nature. For the analysis of elementary data, a unit of analysis must be selected, and in this case, trips made by individuals in Italian regions were chosen. The aggregated estimate of domestic tourist spending in 2019, obtained from this analysis, amounts to €14.652 billion. Table 2 compares this estimate with the one contained in the satellite accounting tables, limited to domestic tourism, as this is the common reference domain. The amount reported for satellite accounts of €43.962 billion excludes "shopping" and "other" items as they are considered "connected" products to tourism. (ISTAT, 2022).

Table 2 - Tourism Expenses: Travel and Vacation Survey and Satellite Accounts - Million Euros - Year 2019

	Domestic tourism expenses (Travel and Holidays survey)	Domestic tourism expenses (TSA)
Total	14.652	43.962

Source: ISTAT data processing - Travel and Holidays microdata and Tourism Satellite Account.

3– The assessment of the economic impact of tourism: the integrated input-output (I-O) table

ISTAT provides the supply and use tables at current prices and prices of the previous year for the years 2015-2019, consistent with the National Accounts aggregates according to the SEC 2010 (ISTAT, 2022). For our analysis, we used the industry-by-industry (63 economic branches) I-O table for the year 2019. Tourism is an economic sector (UNWTO, 2014) that spans across several branches of the economy and generates a spillover effect on other economic activities due to the increase in tourism spending. The high intersectoral interdependence that characterizes the tourism sector suggests the use of the I-O framework to identify the link between tourism and other economic sectors (Fletcher, op.cit.). Recent scientific literature on input/output analysis with reference to tourism (Siswahto, et al., 2020; Shu, et al., 2022; Surugiu, 2009; Tarawneh, 2022) provides useful insights for research. In many countries, such as Sulawesi, China, Romania, and Jordan, the I-O framework has been used to analyze production, income, and employment flows among different industries and sectors of the economy. Furthermore, in addition to evaluating the direct impact of tourism, indirect and induced estimates can be made by identifying the multiplier effect on other economic activities and the overall economy. Lamonica and Mattioli (2015) demonstrated that, considering the direct and indirect linkages between economic sectors in some industrialized countries, tourism can be considered a key sector only in China, while in the other analyzed countries it appears as an independent sector. In particular, the authors employed two indices derived from the approach of Hood and Rasmussen (1956). The first, backward linkage, measures the relative importance of each sector as a purchaser of all other sectors

in the economy. Values greater than 1 indicate that the sector in question is important because it requires a level of production from other sectors that is above the general average. Conversely, values below 1 indicate lower importance. The second index (forward linkage) measures the level to which the output of a sector is used as input for the remaining productive sectors. In this case as well, the higher the index is relative to 1, the more important the corresponding sector becomes because it provides its production to others at a level that exceeds the general average. Conversely, the lower the index falls below 1, the less important the sector is considered. The joint analysis of these two indices (Power and Sensitivity dispersion) allows for the determination of how an individual sector is intertwined in the economic structure of a country and how important it is. In general, if the sector analyzed registers values below unity in both indices, it is defined as an "independent or isolated sector" that acquires input and sells output below the average. In the case of a backward index greater than 1 and a forward index lower than 1, the sector can be defined as "leading", as it acquires production from other sectors above the average but transfers its production below the average. In the opposite case, a "strategic sector" is present, with output oriented towards the economic system. If both indices are above unity, the sector is defined as "key" since it acquires and transfers production above the average.

Finally, a last consideration must be made regarding the usefulness of these studies in an international comparative perspective and concerns the definition of the tourism industry. Indeed, it has not yet been uniformly defined (Petrei and Antolini, 2021), which makes current official estimates (Eurostat, 2023) based on Structural Business Statistics (SBS) and Short-Term Statistics, rather than on satellite accounts (due to the lack of data uniformity). As highlighted, the use of relevant statistics for research purposes is crucial for the validity of the study (Briassoulis, 1991; Sun et al., 2020).

In the tourism context, this aspect becomes even more relevant, as the Input-Output framework does not include a specific sector such as tourism, and many economic activities related to tourism do not offer goods and services exclusively intended for visitors. Satellite accounting provides us with two important pieces of information: first, it allows us to identify the branches of activity that contribute to the formation of the tourism industry, as satellite accounting is a product matrix by branch of activity. Additionally, it is possible to derive for each branch the tourist coefficients by reworking the information contained in table 6 of the TSA (Table 3).

Table 3 - Tourist coefficients by CST activity branch - Year 2019

TSA activity branch and I-O	Tourist coefficient
Accommodation and food service	0,62
Land transport and pipeline transport	0,55
Maritime transport	0,56
Air transport	0,99
Equipment rental	0,07
Travel agencies	0,99
Cultural services	0,12
Sports and recreation	0,11
Retail trade in goods	0,23

Source: Data processing Tourism Satellite Account

The classification and aggregation of branches used in the input-output table, which represents the economic structure of a country, is different from that used by TSA, where the purpose is to define the tourism industry and the relative importance of other industries in this sector. More specifically, the problem concerns the aggregation of "Accommodation and Food services" separated in TSA and the larger sector of "Land Transport and Pipeline Transport". To determine the tourism intensity of these aggregated sectors, the arithmetic mean of the tourism coefficients for "Visitor Accommodation" and "Food and Beverage

Services" as well as "Rail Transport" and "Road Transport" was used (Antolini, Giusti, Petrei, 2022). This methodology allows to identify the tourism and non-tourism components for each of the sectors considered. In the new I-O framework, the corresponding original activity branches were replaced, thus avoiding duplication, by introducing a "Tourism" sector and a complementary "Non-Tourism" sector. Subsequently, by aggregating the sectors provided in the original input-output table, the input-output matrix (15x15) was constructed, on which the necessary elaborations were carried out (see Annexes 1, 2, and 3).

3.1 – ***The integrated Input-Output table and estimation of tourist coefficients and multipliers***

The input-output (I-O) analysis has been utilized to estimate the changes in final demand for tourism on other industries. The major applications of input-output analysis have been discussed in Miernyk (1965), Leontief (1987), Miller and Blair (2009), Eurostat (2008), and Garau (2021). Input-output analysis has been employed in several studies to evaluate the economic impact of a particular sector of the economy (Chang et al., 2016). This approach is considered particularly appropriate for estimating the effect of an economic sector, as well as identifying the relationships between the various sectors and final demand, through an evaluation of the impact on production, value added, and employment (Dwyer et al., 2004). The integrated input-output table (I-O), as previously illustrated, allows estimating the technical coefficients (*input coefficients*) a_{ij} , which are the proportion of the total production input of industry *j* (tourism) on the most connected economic activity branches (equation 1):

$$\boldsymbol{a_{ij} = \frac{x_{ij}}{X_j}} \quad \textbf{(1)}$$

This coefficient is useful to indicate the monetary units from the tourism branch needed to produce one monetary unit for each of the other branches of economic activity. If we assume that $x_{ij} = a_{ij} * X_j$, we can provide a different interpretation of the existing interdependencies (equation 2):

$$\sum_{i}^{n} \boldsymbol{x_{ij}} = \sum_{i}^{n} \boldsymbol{a_{ij} * X_j} + \sum_{i}^{n} \boldsymbol{Y_i} \quad \textbf{(2)}$$

From the system of relationships (2), the total production of a sector (X) is equal to the sum of intermediate demand and total final demand (Y):

$$\boldsymbol{X = A*X + Y} \quad \textbf{(3)}$$

Solving equation (3) for total production X yields:

$$\boldsymbol{X = (I\text{-}A)^{-1} * Y} \quad \textbf{(4)}$$

Thus,

$$\boldsymbol{\Delta X = (I\text{-}A)^{-1} * \Delta Y} \quad \textbf{(5)}$$

Where *I* is the identity matrix and $(I\text{-}A)^{-1}$ is the so-called *Leontief* inverse or total requirements table. The last equation indicates that a change in final demand translates into a change in total production using the Leontief inverse matrix $(I\text{-}A)^{-1}$. The *Output Multiplier (OM)* enables predicting the increase in economic activity in other sectors for each increase in spending in the tourism sector (White, 2002). The OM can be calculated through the summation of column G (the tourism sector) and, thus, shows the total increase in national production resulting from a 1 EUR increase in final demand for tourism. The *Earnings Multiplier (EM)* measures the total variation in earnings in the economy from a 1 EUR change in final demand of a particular

sector. The tourism EM (White, ibid.) is obtained using the total requirements table and direct earnings coefficients as:

$$C = (I-A)^{-1} * E \quad (6)$$

where:

C is the matrix of income multipliers, *E* is an *n×n* matrix containing the income coefficient of the *i-th* sector in its *i-th* diagonal and zeros elsewhere.

The *value-added multiplier (VAM)* quantifies the change in total value added resulting from a one-unit increase in final demand in each sector (White, op.cit.). To compute the tourism *VAM*, the total requirements table and direct value added (VA) coefficients are utilized according to:

$$T = (I-A)^{-1} * V \quad (7)$$

where:

T represents the *VA* multiplier matrix, *V* is an *n×n* matrix that contains the VA coefficients of the *i-th* sector in its *i-th* diagonal and zeroes elsewhere.

Furthermore, it is crucial to assess the number of jobs generated due to the rise in final demand. The *employment multiplier (LM)* measures the total variation in employment resulting from a one-unit change in the labor force employed in a specific industry. The new employment generated by the tourism sector multiplied by the employment multiplier for that sector provides an estimation of the overall new jobs created in the study region (White, op.cit.).

The tourism *LM* is obtained using the total requirements table and direct employment coefficients as:

$$Z = (I-A)^{-1} * L \quad (8)$$

where:

Z is the employment multiplier matrix, *L* is an *n×n* matrix containing the direct employment coefficient of the *i-th* sector in its *i-th* diagonal and zeros elsewhere.

Following, the *forward linkages* proposed by Augustinovics (1970) for production, value added, earnings, and employment are presented. The multipliers are based on the direct and indirect effects resulting from an exogenous change in the final demand of a sector. According to Augustinovics (op. cit.), the forward linkage coefficients reveal intermediate consumption as a percentage of total sectoral sales, including final demand. The *forward linkage coefficients (FL)* are calculated as follows:

For production:

$$OFL = \sum_{j=1}^{n} B_{ij} \quad (9)$$

Where B_{ij} are the corresponding elements of the total requirement matrix.

For earnings:

$$EFL = \sum_{j=1}^{n} C_{ij} \quad (10)$$

Where C_{ij} are the corresponding elements of the earnings matrix (Eq. 6).

For Employment:

$$\boldsymbol{LFL} = \sum_{j=1}^{n} \boldsymbol{Z_{ij}} \tag{11}$$

Where $\boldsymbol{Z_{ij}}$ are the corresponding elements of the employment matrix (eq.8).

In our study, the *forward linkages* describe the changes in production, employment, and income of the entire economy resulting from a variation of value added within the tourism sector. One of the characteristics of Input-Output analysis is its ability to evaluate the strength of each sector in its relationships with other sectors (Arriagada and Navarro, 2018). This strength is assessed through the measurement of the degree of dispersion (equation 12) and sensitivity (equation 13). As previously discussed, the power of dispersion represents a measure of the ability of a sector to influence the creation of output and incomes in all sectors, thanks to the demands of products coming from that sector. The power of dispersion index of sector *j*, in our study the tourism sector (G), can be expressed by using the equation:

$$\boldsymbol{BL_j} = \frac{\boldsymbol{n}\sum_{i=1}^{n} \boldsymbol{a_{ij}}}{\sum_{i=1}^{n}\sum_{j=1}^{n} \boldsymbol{a_{ij}}} \tag{12}$$

A value of $\boldsymbol{BL_j} > \mathbf{1}$ indicates that the dispersion power of sector *j* is higher than the average of all sectors or that sector *j* has a relatively high dispersion power. On the other hand, the sensitivity level of a sector, namely its ability to respond to the demand for products from other sectors, can be evaluated by the level of the sector *i* index, formulated as follows:

$$\boldsymbol{FL_j} = \frac{\boldsymbol{n}\sum_{j=1}^{n} \boldsymbol{a_{ij}}}{\sum_{i=1}^{n}\sum_{j=1}^{n} \boldsymbol{a_{ij}}} \tag{13}$$

If $\boldsymbol{FL_j} > \mathbf{1}$, this indicates that sector i has a sensitivity level that is higher than the average of all sectors, or that it is relatively high. As previously mentioned, if an economic sector has a value for both the power dispersion index and sensitivity level greater than 1 (**FL > 1 < BL**), it can be regarded as a leading or pivotal sector in a nation's economy.

4. The intersectoral linkages of the tourism sector in Italy

4.1 - *Technical Coefficients*

The direct requirement coefficients indicate the quantity of production factors directly purchased to produce one EUR of output. The "Acquired" and "Supplied" columns show, respectively, the inputs from different productive sectors required to produce 1 EUR in the tourism sector and the inputs sold to other economic sectors to produce one monetary unit (Table 4).

Table 4 - Technical Coefficients for Tourism - Year 2019

Sector of economic activity	ACQUIRED	Rank	SUPPLIED	Rank
Agriculture_hunting_forestry_fishing_aquaculture	0,015	11	0,009	12
Mining_quarrying	0,003	14	0,007	14
Manufacturing_industry	0,132	1	0,016	9
Energy	0,024	8	0,029	5
Construction	0,008	13	0,024	6
Trade	0,039	3	0,034	4
Tourism	**0,052**	**2**	**0,052**	**2**
Non-tourism	**0,036**	**6**	**0,040**	**3**

Logistics	0,033	7	0,091	1
Advertising	0,024	9	0,016	8
Finance_accounting	0,038	5	0,009	13
Real estate	0,039	4	0,004	15
Public sector	0,015	12	0,012	10
Research_and_development	0,019	10	0,018	7
Other	0,001	15	0,009	11
TOTAL	0,478	-	0,370	-

Source: ISTAT Data Processing- The Input-Output Table System

In 2019, the tourism sector in Italy purchased 0.132 EUR from the Manufacturing sector; 0.052 EUR from the Tourism activities; 0.039 EUR from the Commerce and Real Estate sectors; and 0.038 EUR from Finance and Accounting. This indicates that the tourism industry can promote economic growth on its own, or in other words, it is self-sustaining. This conclusion is reached by analyzing the value of 0.052 for the products supplied to other branches of economic activity, which once again represents the highest value in favor of the "tourism" sector.

4.2 – *Tourism Multipliers*

The multipliers of output (O_m), income (E_m), value added (VA_m) and employment (L_m) are shown (Table 5) and analyzed below.

Table 5 – Multipliers (Backwards linkages) - Anno 2019

Sector of economic activity	O	Rank	E	Rank	VA	Rank	L	Rank
Agriculture_hunting_forestry_fishing_aquaculture	1,638	11	0,218	13	0,671	13	0,016	3
Mining_quarrying	1,174	14	0,055	15	0,147	15	0,001	15
Manufacturing_industry	2,035	3	0,265	12	0,546	14	0,008	12
Energy	2,279	1	0,298	11	0,797	11	0,008	12
Construction	2,222	2	0,377	5	0,827	8	0,015	5
Trade	1,804	8	0,340	9	0,854	4	0,014	7
Tourism	**1,886**	**7**	**0,350**	**6**	**0,800**	**10**	**0,015**	**5**
Non-tourism	**1,911**	**5**	**0,349**	**7**	**0,820**	**9**	**0,014**	**7**
Logistics	1,956	4	0,395	4	0,829	7	0,012	9
Advertising	1,887	6	0,343	8	0,788	12	0,010	10
Finance_accounting	1,648	10	0,336	10	0,850	5	0,010	10
Real estate	1,270	15	0,072	14	0,952	1	0,004	14
Public sector	1,557	12	0,588	1	0,897	3	0,016	3
Research_and_development	1,695	9	0,423	3	0,839	6	0,017	2
Other	1,363	13	0,522	2	0,931	2	0,044	1

Source: ISTAT Data Processing- The Input-Output Table System

In 2019, an increase of 1 EUR in tourism resulted in a total increase of 1.886 EUR (Ranking 8) in the production of the Italian economy, according to the production multiplier (O). The Earning Multiplier (E) indicates that an increase of 1 EUR in final demand in tourism would increase the income of the economy by 0.352 EUR (Ranking 6). The value-added multiplier for tourism is 0.800 (Ranking 10), providing an estimate of the generated value added. The employment multiplier (L) highlights the significance of a sector in creating jobs. For example, a multiplier of 2 means that for every job created by a specific sector, another job will be created in other sectors, resulting in a total of 2 jobs. In 2019, tourism had the potential to increase employment in Italy by 0.015 (Ranking 5). The "Other" category, which aggregates services, records the highest values. Table 6 presents the forward linkages for production, earnings, and employment for the year 2019.

Table 6 – Forwards linkages – Year 2019

Sector of economic activity	O_{FL}	Rank	E_{FL}	rank	L_{FL}	rank
Agriculture_hunting_forestry_fishing_aquaculture	1,300	13	0,161	13	0,016	5
Mining_quarrying	1,204	14	0,031	15	0,001	15
Manufacturing_industry	3,966	1	0,449	5	0,012	9
Energy	1,979	3	0,204	12	0,004	13
Construction	1,481	11	0,254	11	0,012	10
Trade	1,764	4	0,354	6	0,016	3
Tourism	**1,640**	**7**	**0,333**	**7**	**0,015**	**6**
Non-tourism	**1,634**	**8**	**0,316**	**10**	**0,013**	**8**
Logistics	1,522	10	0,331	8	0,009	11
Advertising	1,746	5	0,321	9	0,008	12
Finance_accounting	2,366	2	0,510	2	0,014	7
Real estate	1,625	9	0,041	14	0,003	14
Public sector	1,331	12	0,632	1	0,016	4
Research_and_development	1,724	6	0,509	3	0,022	2
Other	1,044	15	0,487	4	0,044	1

Source: ISTAT Data Processing- The Input-Output Table System

In terms of production (O), the inter-sectoral interdependence of the tourism sector is 1.640, ranking it seventh among the 15 analyzed economic activity sectors. The Augustinovics coefficients (op. cit.) concerning profits (EFL) and employment (LFL) confirm the sector's limited importance, with values of 0.333 and 0.015, respectively. Multipliers emphasize the level of interdependence among various sectors in an economic system. Their determination allows for understanding the importance of a specific economic activity branch on the national economy. As previously stated, this reading can be complemented with the values recorded in the power and degree of dispersion sensitivity registered by the tourism sector (Table 7).

Table 7 – Power and sensitivity dispersion - Year 2019

Sector of economic activity	Power	rank	Sensitivity	rank
Agriculture_hunting_forestry_fishing_aquaculture	0,933	11	0,741	13
Mining_quarrying	0,669	15	0,686	14
Manufacturing_industry	1,160	3	2,260	1
Energy	1,299	1	1,128	3
Construction	1,266	2	0,844	11
Trade	1,028	8	1,005	4
Tourism	**1,075**	**6**	**0,934**	**7**
Non-tourism	**1,089**	**5**	**0,931**	**8**
Logistics	1,114	4	0,867	10
Advertising	1,075	6	0,995	5
Finance_accounting	0,939	10	1,348	2
Real estate	0,724	14	0,926	9
Public sector	0,887	12	0,758	12
Research_and_development	0,966	9	0,982	6
Other	0,777	13	0,595	15

Source: ISTAT Data Processing- The Input-Output Table System

The dispersion power index of the tourism sector has a value above the average (relatively high) at 1.075. This indicates that demand in the tourism sector has a strong influence on the production of goods in all

sectors of the Italian economy. Table 7 shows that in addition to having a high distribution power, the tourism sector records a significant degree of sensitivity, although not above the average, with a value of 0.934. These results confirm the hypothesis of a tourism sector that can be further integrated into the production chain of our country, confirming tourism as a significant sector (leading) for the Italian economy.

Conclusions

The distinction between the contribution to GDP of an economic sector and the assessment of the overall economic impact of the sector on other economic sectors and the entire economic system represents two profiles of analysis that require the use of differentiated methodologies. In the specific context of the tourism sector, the contribution to GDP provided by this sector is evaluated through the use of satellite accounting frameworks. Despite the methodological problems arising from the lack of specific regulation for tourism satellite accounts, this framework allows highlighting the importance of tourist expenditure as a reference aggregate for estimating the contribution of tourism to GDP formation. Precisely because of this consideration, we focused on the analysis of tourism expenditure, comparing the estimated amount obtained by reworking the microdata from the survey on Italian household expenditure (amounting to 14,652 million) with the data disseminated by the TSA (43,962 million) in relation to domestic tourist flows. Tourism expenditure is also significant from the perspective of Output Multipliers within the Input-Output framework. This methodology, in contrast to the TSA, enables the analysis of the impact generated on the economic system by individual branches of economic activity. Unfortunately, the classification of economic activities, suitably aggregated into activity branches, does not permit the consideration of tourism as an autonomous sector. To address this limitation, we have employed the approach of the tourism industry, as defined by the TSA, with particular attention given to the weighting of tourism-specific activities. The tourism intensity coefficients provided by the TSA have been utilized to assign weights to the various branches of economic activities within the Input-Output table, thus establishing an autonomous sector known as "tourism." The segment comprising activities that do not strictly align with the tourism context, representing the complement, has been consolidated within the activity branch labeled "Non-Tourism." Subsequently, the newly integrated Input-Output table was utilized to calculate the technical coefficients, enabling the determination of the Leontief inverse matrix and, consequently, the various Output Multipliers. The analysis of the technical coefficients (0.52) reveals the independent nature of the tourism sector and its limited interconnectivity with other sectors. Notably, a 1 euro increase in the tourism sector yields a production increase of 1.886 euros for the entire economic system (O). Concerning the Earnings Multipliers (E), a 1 euro increment in the demand for the tourism sector results in income increases of 0.352, value added increases of 0.8, and employment increases of 0.015, respectively. When assessing the interdependence with other sectors, the individual coefficients amount to 1.640 for production, and 0.333 and 0.015 for profits and employment, thereby confirming the overall relative autonomy of the tourism sector in relation to others. Furthermore, the analysis of dispersion and sensitivity implies the sector's capacity to stimulate the entire economy. Specifically, the tourism demand exhibits a dispersion index of 1.075, while the sensitivity analysis, with an index of 0.934, underscores the insufficient integration of tourism within the country's value chain.

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Appendix

Annex 1 - The 63 economic activity sectors included in the I/O table - year 2019

Code	Sector economic activity name
V01	Plant and animal production, hunting and related services
V02	Forestry and use of forest areas
V03	Fishing and aquaculture
VB	Mining and quarrying
V10_12	Food, beverage, and tobacco industries
V13_15	Textile, clothing, leather, and related industries
V16	Wood and cork, excluding furniture; straw and wickerwork articles

V17	Paper and paper products manufacturing
V18	Printing and reproduction of recorded media
V19	Manufacture of coke and refined petroleum products
V20	Chemical product manufacturing
V21	Basic pharmaceutical product and pharmaceutical preparations manufacturing
V22	Rubber and plastic products manufacturing
V23	Other non-metallic mineral product manufacturing
V24	Metallurgical industry
V25	Manufacture of metal products, except machinery and equipment
V26	Computer, electronic, and optical products manufacturing
V27	Electrical equipment manufacturing
V28	Machinery and equipment manufacturing n.e.c.
V29	Manufacture of motor vehicles, trailers, and semi-trailers
V30	Other transport equipment manufacturing
V31_32	Furniture manufacturing; other manufacturing industries
V33	Repair and installation of machinery and equipment
VD	Electricity, gas, steam, and air conditioning supply
V36	Water collection, treatment, and supply
V37_39	Sewerage management; waste collection, treatment, and disposal; materials recovery; remediation activities and other waste management services
VF	Construction
V45	Wholesale and retail trade and repair of motor vehicles and motorcycles
V46	Wholesale trade, except for motor vehicles and motorcycles
V47	Retail trade, except for motor vehicles and motorcycles
V49	Land transport and transport via pipelines
V50	Maritime and inland waterway transport
V51	Air transport
V52	Warehousing and support activities for transportation
V53	Postal and courier activities
VI	Accommodation and food service activities
V58	Publishing activities
V59_60	Motion picture, video, and television program production, sound recording, and music publishing; programming and broadcasting activities
V61	Telecommunications
V62_63	Computer programming, consultancy, and related activities; information service activities
V64	Financial service activities, except insurance and pension funding
V65	Insurance, reinsurance, and pension funding, except compulsory social insurance
V66	Auxiliary financial and insurance service activities
VL	Real estate activities
V69_70	Legal and accounting activities; head office activities; management consultancy activities
V71	Architectural and engineering activities; technical testing and analysis
V72	Research and development
V73	Advertising and market research
V74_75	Other professional, scientific, and technical activities; veterinary services
V77	Rental and leasing activities
V78	Employment activities, including recruitment, placement, and supply of personnel
V79	Travel agency, tour operator, and reservation service activities; related activities
V80_82	Security and investigation services; services to buildings and landscape; office administrative, office support and other business support activities
VO	Public administration and defense; compulsory social security
VP	Education
V86	Human health activities
V87_88	Social work activities
V90_92	Creative, arts, and entertainment activities; library, archive, museum, and other cultural activities; gambling and betting activities
V93	Sports, entertainment, and recreation activities
V94	Membership organizations activities

V95	Repair of computers and personal and household goods
V96	Other personal service activities
VT	Activities of households as employers of domestic personnel; production of undifferentiated goods and services for own use by households and non-profit institutions serving households

Source: ISTAT Data Processing- The Input-Output Table System

Annex 2 - The 18 sectors of economic activity obtained by tourist coefficient - year 2019

Code	Sector economic activity name
N1	TOURISM - Accommodation and catering
N2	TOURISM - Land transport and pipeline transport
N3	TOURISM - Maritime transport
N4	TOURISM - Air transportation
N5	TOURISM - Equipment rental
N6	TOURISM - Travel agencies
N7	TOURISM - Cultural services
N8	TOURISM - Sports and recreation
N9	TOURISM - Retail trade in goods
N10	COMPLEMENT - Accommodation and catering
N11	COMPLEMENT - Land transport and pipeline transport
N12	COMPLEMENT - Maritime transport
N13	COMPLEMENT - Air transport
N14	COMPLEMENT - Equipment rental
N15	COMPLEMENT - Travel agencies
N16	COMPLEMENT - Cultural services
N17	COMPLEMENT - Sports and recreation
N18	COMPLEMENT - Retail trade in goods

Source: ISTAT Data Processing- The Input-Output Table System

Annex 3 - The 15 sectors of economic activity used in the I-O analysis - year 2019

New code	Sector economic activity name	Previous codes
A	Agriculture_hunting_forestry_fishing_aquaculture	V01 + V02 +V03
B	Mining_quarrying	VB
C	Manufacturing_industry	V10_12 + V13_15 + V16 + V17 + V18 + V19 + V20 + V21 + V22 + V23 + V24 + V25 + V26 + V27 + V28 + V29 + V30 + V31_32 + V33
D	Energy	VD + V36
E	Construction	VF
F	Trade	V45 + V46 + N18
G	***Tourism***	**N1 + N2 + N3 + N4 + N5 + N6 + N7 + N8 + N9**
H	***Non-tourism***	**N10 + N11 + N12 + N13 + N14 + N15 + N16 + N17**
I	Logistics	V52 + V53
L	Advertising	V58 + V59_60 + V61 + V62_63 + V73
M	Finance_accounting	V64 + V65 + V66
N	Real estate	VL + V69_70 + V71
O	Public sector	VO + VP + V86 + V87_88 + V90_92 + V93 + V94
P	Research_and_development	V72 + V74_75 + V77 + V78 + V79 + V80_82
Q	Other	V95 + V96 + VT

Source: ISTAT Data Processing- The Input-Output Table System