

GREEK TOURISM IN THE GLOBAL, NATIONAL AND REGIONAL VALUE CHAINS

Theodore Tsekeris

Centre of Planning and Economic Research (KEPE), Amerikis 11, Athens, 10672, Greece

Abstract

This article analyses the relationships between international, domestic and regional value chains and tourism sector, in terms of accommodation and food service activities, in Greece. Initially, methods for determining the role of imports in tourism in the context of global value chains (GVCs) and corresponding GVC participation indicators are presented, based on the OECD trade-in-value-added database. Furthermore, suitable analytical methods are explained for estimating the backward linkages from the agricultural sector, transport and other activities into the Greek tourism sector, at both national and regional levels, and the corresponding import multiplier effects on the Greek economy. The impact of inbound tourism and of the imports of services and goods is found to perform a gradual growth, which varies with origin country and product category. In 2018, the countries having the highest value-added share in Greek tourism exports were Germany (10.6%), Italy (7.8), Russia (6.8%), France (6.2%) and the Netherlands (6.1%). The results highlight the existence of significant interregional variations in the backward linkages of tourism, with island regions having greater linkages within the tourism sector, and less backward linkages with other sectors, such as manufacturing, in contrast to the rest of the country. These empirical findings can offer a deeper understanding of the role that tourism plays in the national and regional economy and the magnitude of its impact. They can also contribute to the formulation of appropriate policies with a national and regional dimension, for the sustainable development of the tourism sector itself and related sectors of the economy that interact with tourism. Among other things, such policies may concern the development of alternative forms of tourism and partnerships aimed at creating vertically integrated value chains, both within the tourism sector and between it and other activity clusters in the Greek economy, such as agriculture, food, trade and transport.

Keywords: *tourism, value chains, imports, multiplier effects, regional analysis.*

1. INTRODUCTION

This article describes literature, methods and results on the relationships between value chains and tourism at global, national and regional levels, with an emphasis on identifying the role of inbound tourism and imports in the tourism sector. Revenues from (mainly inbound) tourism are an important source of income and job creation for Greece and, in particular, for areas of high tourism demand. However, part of the intermediate and/or final goods and services used in the tourism production process are imported. The gross input of tourism in a region may come either from abroad or from other regions of the country, and may involve many different sectors of economic activity, since tourism receipts do not only come from accommodation and food services, but are spread over a number of related activities, such as transport, cultural activities, retail trade in tourist and commercial establishments, etc.

The importance of investigating the international, interregional and intersectoral interactions of tourism for the local economy necessitates to record and analyse the value chains related to tourism. Value chains capture all the purchases and sales of intermediate and final goods and services between countries as well as between regions within a country. Therefore, the development and measurement of appropriate value chain indicators in tourism can accurately capture the extent to which (a) tourism activity is dependent on imports from other countries and (b) the country and Greek regions can benefit from and incorporate tourism receipts into their economy. These indicators can also represent the extent to which tourism interacts with other related sectors of economic activity and, therefore, the potential to exploit synergies and complementary relationships to increase and diffuse tourism receipts throughout the national economy.

In summary, the objectives and intended outcomes of this article are to identify suitable methods and to determine critical parameters that represent and influence, respectively, the relationship between foreign and domestic goods/services value chains and tourism. The data and results presented here can be used to formulate and evaluate policies aimed at enhancing the impact of the tourism sector on the national and local economy. As far as the organisation of the article is concerned, Section 2 presents a brief literature review of the problem at hand. Section 3 describes methodological issues, including indicators of participation in global value chains (GVCs) and national and regional multiplier effects. Section 4 presents the datasets used in the current study. Section 5 shows and discusses the results of the GVC participation indicators for the Greek sector of accommodation and food services, the corresponding backward linkages at the country level and the import multipliers effects of tourism at the regional level. Section 6 summarises and concludes.

2. LITERATURE REVIEW

In the existing literature, there are various methodological approaches for the quantitative and/or qualitative analysis and calculation of the impact of tourism on imports and the share of tourism receipts flowing abroad. A common approach is to calculate an index of tourism receipts' leakage abroad, which refers to the ratio between tourism receipts that remain in the destination country/region and contribute to the national/regional GDP and the total receipts from tourism. This leakage can vary significantly depending on the country, its infrastructure, the geographical and other characteristics of the tourist destination, the category of tourism activity and the composition of production, particularly in relation to the agricultural sector (Ramjee Singh, 2006), the availability and variety of local products and, in particular, food (Bélisle, 1984). The importance of imports has been internationally recognised for accurately measuring the economic and social impacts and management strategies of the tourism sector (Clayton and Karagiannis, 2008; Dwyer et al., 2006; Shakeela et al., 2011). The proportion of imported (intermediate and final) goods and services that is incorporated into the value of domestic demand and exports, and the resulting magnitude of the leakage of domestic demand, is referred to as the 'import content'.

Due to the increased cost and lack of sufficient, up-to-date and highly disaggregated questionnaire data, at the individual level, on either tourist expenditure or tourism enterprises' revenues and expenditures, and the difficulties in covering and recording all possible tourism activities, data collection and processing is usually based on national input-output tables (e.g., Singh et al., 2006) and international input-output and value chain databases. Although these databases provide indirect and cumulative information and are characterised by significant time lags, they can be considered as reliable for analysing the relationships between tourism and other sectors of economy at national and international level.

In Greece, the analysis of input-output tables from the national accounts of the Hellenic Statistical Authority (ELSTAT) has been used to calculate tourism demand and its effects on the national economy (Zacharatos, 1986) and to determine the share of imported goods and services incorporated in the value of demand in tourism and other sectors of the economy (Athanasίου and Tsouma, 2012). The leakage in the amount of tourism demand is mainly attributed to the indirect imported component, i.e., the share of raw materials and intermediate goods and services originating from abroad and used to supply the domestic tourism product.

In this article, we list key indicators that provide useful information on leakages in tourism receipts (or gross exports due to tourism) and the effects of tourism on imports, such as: (a) the tourism backward linkages index in the Global Value Chains (GVCs); (b) the tourism backward linkages index in domestic and regional value chains; and (c) the tourism multiplier effects on imports index, which expresses the total change in imports when final tourism demand changes by one unit (Mazumder et al., 2009). The estimation of these effects can help us to identify possible solutions and implement suitably designed policies to maximise the absorption of tourism receipts by Greek firms, substitute domestic products for imported goods, and enhance the country's competitiveness, particularly in areas of increased tourism demand.

3. METHODOLOGY

3.1. Indicators of tourism participation in value chains

The indicators of a country's participation in GVCs can represent its position in global trade and international production and supply chain networks. Therefore, they demonstrate the country's potential to attract or participate in chain activities of production and processing of goods and services on behalf of firms from other countries (offshoring). According to the OECD methodology (OECD, 2021) for the analysis of international cross-sectoral input-output matrices, the determination of each country's participation in GVCs is defined in terms of its forward (horizontal) linkages and its backward (vertical) linkages with other countries. More specifically, in the present context, forward linkages refer to (intermediate) value-added inputs produced in Greece and incorporated in the gross exports of another country to third countries. Backward linkages refer to the incorporation of (intermediate) value-added inputs produced in other countries into Greece's gross exports. The sum of a country's backward and forward linkages defines its total participation in GVCs (Tsekeris and Skintzi, 2017).

In mathematical terms, the estimation of the backward interlinkages of a country is based on the estimation of the following vector:

$$EXGR_FVA_c = V B_c EXGR_{c,i}, \quad (1)$$

where the vector $EXGR_FVA_c$ corresponds to the external value added (i.e., the value of all intermediate goods and services imported from other countries) which is incorporated in the gross exports of country c . The vector V corresponds to the ratio of value added to total output of country c , the matrix $B_c = (I - A_c)^{-1}$ is the inverse Leontief matrix and A_c is the matrix of the technological factors (or input factors or input ratios) of the economy in country c , defined by the ratio between the input from sector i to sector j and the total output of sector j . $EXGR_{c,i}$ shows the gross exports of goods and services from the sectoral economic activity i from country c to other countries.

Based on the estimated amount of backward linkages, as described in equation (1), the share $EXGR_FVASH_{c,i}$ of the value added produced by other countries in the goods/services of sector i and incorporated into the value-added output of country c as a percentage (%) of the gross exports of $EXGR_{c,i}$ is obtained as:

$$EXGR_FVASH_{c,i} = \frac{\sum_p EXGR_FVA_{c,p,i}}{EXGR_{c,i}} \times 100, \quad (2)$$

where $EXGR_FVA_{c,p,i}$ is the external value added embodied in the sector i of goods/services of country c that are subsequently exported to country p . In the context of the present analysis, the indicator calculated in equation (2) captures the degree of participation of a country in the backward linkages in the GVCs of tourism and, hence, the degree of the dependence of gross exports corresponding to the tourism sector on the imports of intermediate goods and services from abroad.

3.2. Multiplier effects of tourism

The analysis of the cross-sectoral input-output tables, as derived from national accounts data, provides a structural insight into the national economy, exploring the interdependencies between individual sectors and quantifying the effects of an increase in demand for an industry's product on domestic output and employment. At the national and regional levels, based on the processing of data from national and regional accounts, and assuming that technological factors remain constant, i.e., inputs are used in constant proportions (Rasmussen, 1957; Hirschman, 1958; Jones, 1976; Athanasiou et al., 2014; Mariolis et al., 2021), the basic structure of the economy can be described through the following relationship:

$$X = B * Y \quad (3)$$

where $X = [X_i]$ is the total output of sector i , $Y = [Y_i]$ is the total final demand for the output of sector i , the matrix $B = (I - A)^{-1}$ is the inverse Leontief matrix and $A = [a_{ij}]$ is the matrix of technological

factors of the economy of the country or region, whereas each element a_{ij} equals the ratio of Z_{ij} (input from sector i to sector j) to X_i (total output of industry j).

For the analysis of the relations of tourism with the other sectors of the national economy, the tourism's backward linkages refers to the entries (as percentages of the sum of the columns) of the inverted Leontief table. In this case, the indicator of backward linkages in GVCs represents the total change (due to direct and indirect effects) in the total demand for inputs required for a change in demand for the tourism product of one (1) million euro.

This input-output model of the economy can be extended so that the indirect effects of tourism through consumption expenditure and income can be calculated. For this purpose, table **A** is augmented by one row, that of the income or wage coefficient vector, as the ratio of wage compensation (wages and salaries) in each sector to the total supply (output and imports), and by one column, that of the private consumption coefficient vector, as the ratio of household consumption in each sector to the total private consumption, so as to obtain table **D**. Next, the total import multiplier **V** is calculated as:

$$V = i * E \quad (4)$$

where $E = (I - D)^{-1}$ and i is the vector of import coefficients as derived from the ratio between total imports and total supply in each sector (Mazumder et al., 2009; Oosterhaven, 2019). Import multipliers express the total change in imports when final (tourism) demand changes by one unit.

4. DATA

The first main source of data is the OECD Trade in Value Added (TiVA) database. Among other things, this database presents a number of variables and metadata or indicators relating to each country's participation (or degree of integration) in GVCs, both in terms of their economy as a whole and in relation to selected sectors of economic activity. The data collected here relate to the participation of countries and sectors of the world economy in GVCs through the intermediate goods imported and re-exported –as a share of total gross exports– in the tourism sector in Greece (see equation (2)). It should be clarified that the latest (at the time of the current analysis) version of this database (OECD-TiVA) for the year 2021 includes data spanning from 1995 to 2018, and the calculated indicators refer to 66 countries, including those of the OECD, EU27 and G20, as well as selected economies of East and Southeast Asian and South American countries (OECD, 2021). In addition, the OECD-TiVA database covers 45 sectors/industries of economic activity at hierarchical aggregation levels (total for industry, for business services, etc.). The OECD-TiVA database is based on cross-country and cross-sectoral input-output tables, using national accounts statistics for each country, according to the methodology of the United Nations (UN)'s 2008 System of National Accounts (SNA, 2009). The final tables are constructed using additional sources at the international, national and regional levels for supply and use in each sector according to the International Standard Industrial Classification or ISIC, Revision 4.

The data of the input-output tables of the Greek economy are originating from ELSTAT. The regional input-output tables are metadata derived from the processing of the corresponding national input-output table of the Greek economy for the last year with available data (i.e., 2015, at the time of the current analysis). At the national level, input-output data are available at the level of 64 sectors of economic activity. However, regional input-output tables (at the regional level–NUTS-2) are covering 20 sectors, due to the unavailability of macroeconomic data at a higher level of sectoral breakdown at the NUTS-2 level¹. The most accepted and widely used method for regionalising national input-output tables is the one based on a location quotient (LQ) function to convert each element of the national table into the corresponding element of the input-output table of each region. The location quotient of a region is

¹ The names of Greek regions follow the second-level classification of the Nomenclature of Territorial Units for Statistics (NUTS-2) for the sub-national division of the EU regions and are translated to English (in parenthesis) as follows: Attiki (Attica), Sterea Ellada (Central Greece), Kentriki Makedonia (Central Macedonia), Kriti (Crete), Anatoliki Makedonia and Thraki (Eastern Macedonia and Thrace), Ipeiros (Epirus), Ionia Nisia (Ionian Islands), Voreio Aigaio (North Aegean), Peloponnisos (Peloponnese), Notio Aigaio (South Aegean), Thessalia (Thessaly), Dytiki Ellada (Western Greece), Dytiki Makedonia (Western Macedonia).

expressed by the ratio between the share of the gross value added (or employment) of sector i in the total gross value added (or employment) of the reporting region to the national share of sector i (for all regions of the country, in terms of national gross value added or employment) (Flegg et al., 1995; Flegg and Webber, 2000; Flegg and Tohmo, 2016). This method of regionalisation takes into account both the size and sectoral specialisation of each region.

An alternative method of regionalising the national input-output table is one that adjusts each element of the matrix for the simultaneous import and export of goods (cross-hauling) in each region and is referred to as the Cross-Hauling Adjusted Regionalization Method or CHARM (Kronenberg, 2009). CHARM is a variant of the classical commodity-balancing method, taking into account both the size and balance of export-import and the heterogeneity between products. These two methods of regionalisation of the input-output table of the Greek economy can be implemented alternatively and are indirect (non-survey) approaches to the calculation of regional input-output matrices, given the lack of primary surveys for the direct estimation of regional tables.

5. RESULTS

5.1. Results of tourism linkages in global value chains

The international backward linkages of tourism in Greece, in terms of the total value added and the share of value added produced abroad and incorporated in tourism service exports (*EXGR_FVASH*), presents an increasing trend over time during the period 1995-2018 (Fig. 1). On the one hand, these results show the increased participation of Greek tourism into GVCs. On the other hand, they underline the increased dependence of tourism on the production of intermediate and final goods produced abroad. It is stressed that the *EXGR_FVASH* index increased from 9.9% in 1995 to 15.7% in 2018, suggesting the significant leakage of revenues from the domestic tourism activity to foreign countries.

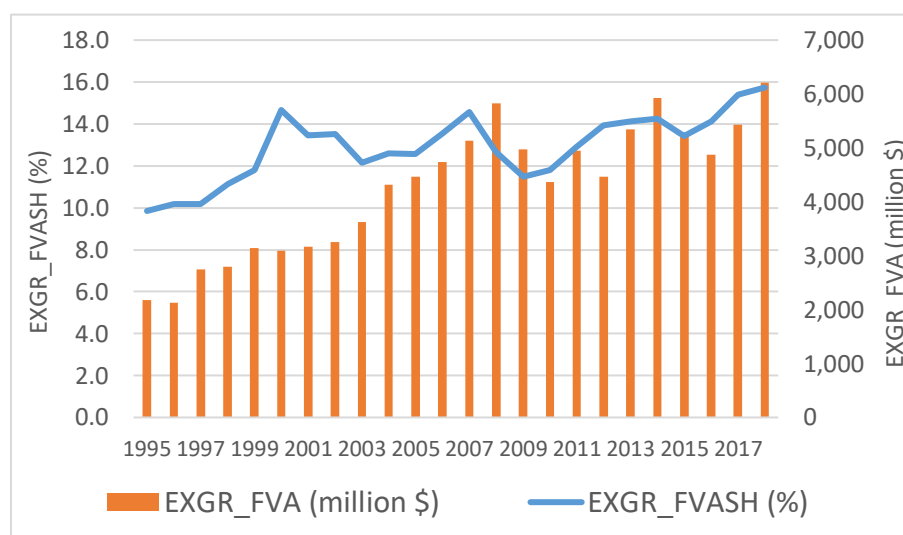


Fig. 1. Time evolution of the international backward linkages of tourism in Greece, 1995-2018.

Source: Own processing of data originating from OECD TiVA.

Regarding the origin of the international backward linkages of tourism in Greece, in the last year of the study period (2018), apart from the rest of the world (for which the backward linkages are aggregated), the largest shares (*EXGR_FVASH*) correspond, in order, to Germany (10.6%), Italy (7.8), Russia (6.8%), France (6.2%) and the Netherlands (6.1%) (Fig. 2). Therefore, the total amount of value added produced abroad and incorporated in Greek exports from tourism is to a significant extent geographically

concentrated in European countries. This outcome reflects the increased degree of interconnectivity of the Greek economy with the European network of value-added chains (Tsekeris, 2021).

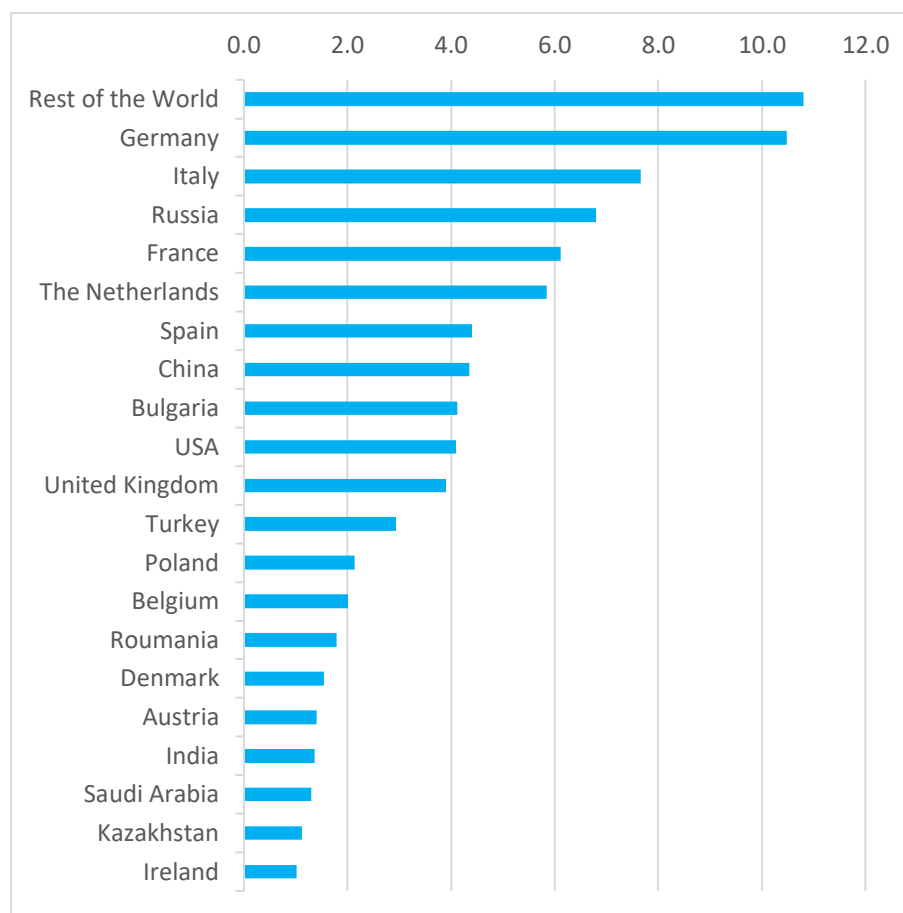


Fig. 2. International backward linkages (%) of tourism in Greece by country of origin, 2018.

Note: Countries with *EXGR_FVASH* shares >1% are included.

Source: Own processing of data originating from OECD TiVA.

5.2. Results of tourism linkages in domestic value chains

Regarding the backward linkages of tourism in the domestic system of value chains at the national level, apart from the intra-industry linkages (within the tourism sector itself), the sectors mostly affected by a unit increase in tourism demand, in order to provide the necessary inputs to satisfy this additional demand, are, in order: Manufacturing (19.2%), which also includes the food and beverage sector, Wholesale and retail trade (6.7%), and the Primary sector (agriculture, forestry, fishing) (4.2%) (Fig. 3). Therefore, these sectors are expected to be most affected by an increase in tourism income.

Regarding the backward linkages of tourism in the domestic value chain system at the regional level, apart from the intra-industry linkages (within the tourism sector itself), the sectors mostly affected by a unitary increase in tourism demand in all regions of the country are those of manufacturing, (wholesale and retail) trade, and the primary sector (agriculture, forestry, fisheries) (Fig. 4). However, the results show the existence of significant interregional variations in the backward linkages of tourism, which are intertwined with the productive specialisation of each region. In particular, the island regions (Notio Aigaio, Ionia Nisia, Voreio Aigaio, Kriti), which have an increased tourism demand, exhibit higher interconnections within the tourism sector, and lower vertical interconnections with other sectors, such as manufacturing, in contrast to the rest of the country.

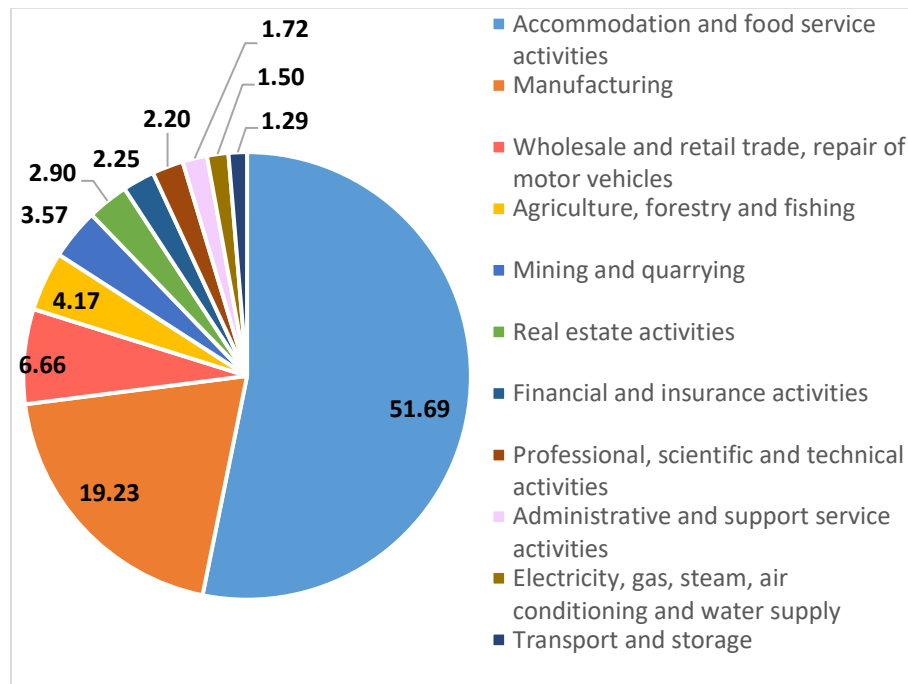


Fig. 3. Domestic vertical tourism linkages at national level.

Note: Sectors whose linkages with Accommodation & food services are greater than 1% are included.

Source: Own processing of the national input-output table originating from ELSTAT (as of 2015).

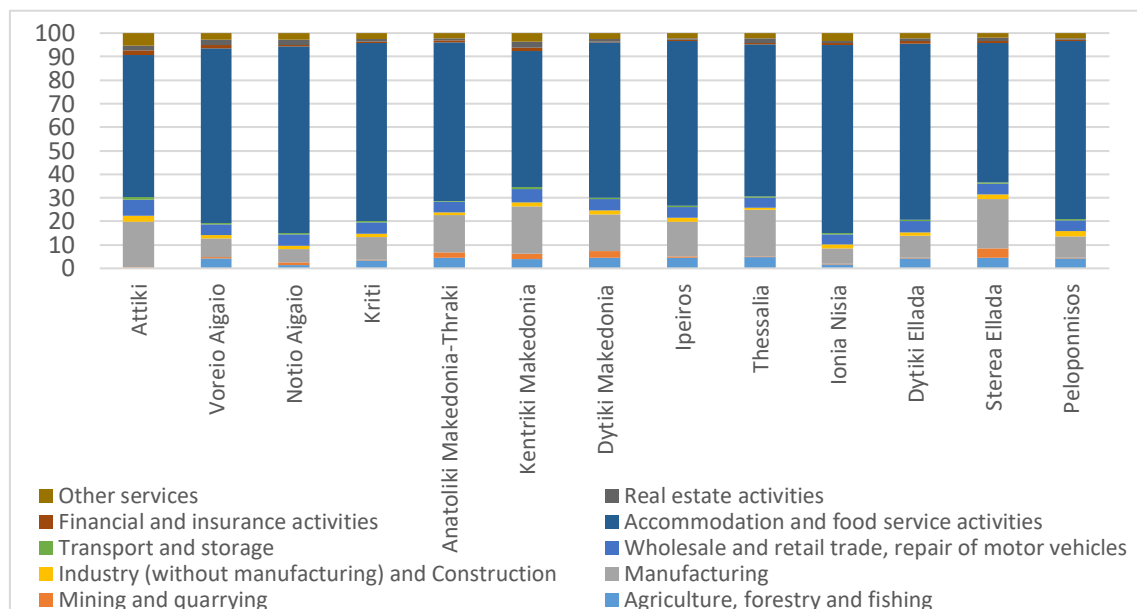


Fig. 4. Percentage (%) distribution of domestic backward linkages with tourism at the regional level.

Source: Own processing of the national input-output table originating from ELSTAT (as of 2015).

5.3. Multiplier effects of tourism on imports

In terms of the total (direct and indirect) multiplier effects on imports (in million euro) of a one million euro increase in demand for tourism (accommodation and food service activities), the largest effects are found in mainland regions, such as Thessalia (0.43), Sterea Ellada (0.42), Kentriki Makedonia (0.41), and Attiki (0.41). In contrast, island regions, which have the highest tourism demand, show significantly lower multiplier effects on imports, namely: 0.33 for Ionia Nisia, 0.34 for Voreio Aigaio, 0.34 for Notio Aigaio, and 0.35 for Kriti (Fig. 5). These results indicate the ability of peripheral regions with high tourism demand to retain a larger share of tourism revenues in the country –possibly by adjusting their production structure– compared to other regions, especially, those with a relatively high industrial share in their total production.

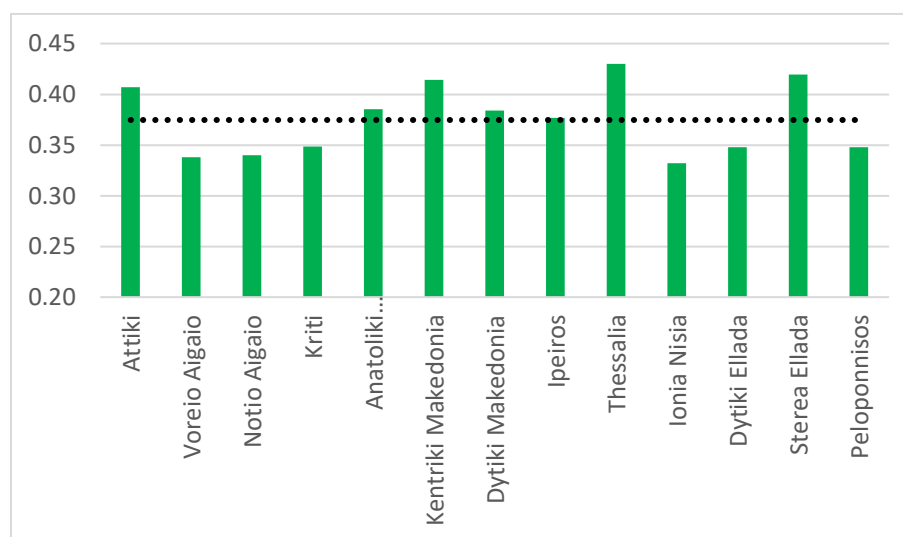


Fig. 5. Multiplier effects of tourism on imports by region.

Note: The dotted line denotes the national average import multiplier of tourism.

Source: Own processing of the national input-output table originating from ELSTAT (as of 2015) and Rodousakis et al. (2022).

6. CONCLUSIONS

In this article, various methodological approaches were implemented to empirically analyse the role of imports and international value chains in the tourism sector in Greece. The application of the proposed methods allows for a deeper understanding of the interactions between tourism and other sectors of economic activity at multiple levels and the identification of the actual impact of domestic tourism activity on the national economy. By extension, the empirical analyses and the resulting indicators can help to formulate suitable policies and good practices for enhancing the income generated by tourism activities, through promoting local value-added chains and further developing tourism in sustainable and competitive terms, in association with tourism-related sectors of the economy (see also Tsekeris (2017)).

The increasing proportion of the imported component of tourism in Greece stresses the need to formulate and strengthen policies to address the lack of self-sufficiency or the shortage of resources available in the country to supply catering/food services and hotels/accommodation enterprises. Such policies should be spatially and sectorally targeted, including vertical production processes of agricultural and food products for distribution in accommodation facilities, so as to enhance the domestic value added and upgrade the quality of domestic goods, compared to imported ones. For this purpose, the efficiency and reliability of supply chains in tourism businesses should be improved, together with the organisation

and deployment of regional agri-food distribution/consolidation centres, through the development of modern storage facilities and the use of combined transport and specialised delivery services (e.g. agri-food logistics) with upgraded vehicle fleets.

Related policies to enhance the domestic value added in tourism are the certification of the Protected Designation of Origin (PDO) and the Protected Geographical Indication (PGI) for food-related products, the Appellation of Origin of Superior Quality and Designation of Origin for Greek wines (VQPRD), the Special Quality Label for Greek Cuisine, the Greek Breakfast and the creation of other Greek brands, the strategic promotion of the Greek tourism product and activities to promote the Greek food and alternative forms of tourism. The current findings could also contribute to the deployment of a National Observatory for the Sustainable Tourism Development, as initiated by the Ministry of Tourism. More specifically, the data and indicators described here could contribute to the determination of the overall carrying capacity and the strategic management of tourism destinations at national and regional levels, in order to enhance the sustainability and resilience of Greek tourism.

ACKNOWLEDGMENTS

This work was partially supported by the project “ENIRISST – Intelligent Research Infrastructure for Shipping, Supply Chain, Transport and Logistics” (MIS 5027930) which was implemented under the Action “Reinforcement of the Research and Innovation Infrastructure”, funded by the Operational Programme “Competitiveness, Entrepreneurship and Innovation” (NSRF 2014-2020) and co-financed by Greece and the European Union (European Regional Development Fund).

REFERENCES

1. Ramjee Singh, DH 2006, “Import content of tourism: Explaining differences among island states”, *Tourism Analysis*, vol. 11, no. 1, pp. 33–44.
2. Bélisle, FJ 1984, “Tourism and food imports: The case of Jamaica”, *Economic Development and Cultural Change*, vol. 32, no. 4, pp. 819–842.
3. Clayton, A, Karagiannis, N 2008, “Sustainable tourism in the Caribbean: Alternative policy considerations”, *Tourism and Hospitality Planning & Development*, vol. 5, no. 3, pp. 185–201.
4. Dwyer, L, Forsyth, P, Fredline, L, Jago, L, Deery, M, Lundie, S 2006, *Concepts of tourism yield and their measurement*, CRC for Sustainable Tourism, Pty Limited, Gold Coast, Queensland, Australia.
5. Shakeela, A, Ruhanen, L, Breakey, N 2011, “The role of employment in the sustainable development paradigm—The local tourism labor market in small island developing states”, *Journal of Human Resources in Hospitality & Tourism*, vol. 10, no. 4, pp. 331–353.
6. Singh, DR, Birch, A, McDavid, H 2006, “Impact of the hospitality-tourism sector on the Jamaican economy, 1974-1993: an input-output approach”, *Social and Economic Studies*, vol. 55, no. 3, pp. 183–207.
7. Zacharatos, GA 1986, “Tourist consumption: Estimation method and its utility for the research of the impact of tourism on the national economy”, *Studies*, vol. 25, KEPE, Athens, Greece.
8. Athanassiou, E, Tsouma, A 2012, “The import content of consumption and exports in Greece: Sectoral analysis and growth prospects through import substitution”, *Greek Economic Outlook*, vol. 20, pp. 67-74.
9. Mazumder, MNH, Ahmed, EM, Al-Amin, AQ 2009, “Does tourism contribute significantly to the Malaysian economy? Multiplier analysis using IO technique”, *International Journal of Business and Management*, vol. 4, no. 7, pp. 146–159.

10. OECD 2021, *Guide to OECD's Trade in Value Added Indicators*, 2021 Edition, OECD Publishing, Paris, France.
11. Tsekeris, T, Skintzi, G 2017 "Participation and possibilities of Greece in global value chains", *Greek Economic Outlook*, vol. 32, pp.68-76.
12. Rasmussen, PN 1957, *Studies in Inter-Sectoral Relations*, North-Holland, Amsterdam, The Netherlands.
13. Hirschman, AO 1958, "Interdependence and industrialization", *The Strategy of Economic Development*, Chapter 6, Yale University Press, New Haven, CT, pp. 98-119.
14. Jones, LP 1976, "The measurement of Hirschmanian linkages", *Quarterly Journal of Economics*, vol. 90, no. 2, pp. 323–333.
15. Athanassiou, E, Tsekeris, T, Tsouma, A 2014 "Input-output analysis and multiplier effects in the Greek economy", *Greek Economic Outlook*, vol. 24, pp. 63-72.
16. Mariolis, T, Rodousakis, N, Soklis, G 2021, *Spectral Value Theory and Actual Economies: Controllability, Effective Demand, and Cycles*, Springer, Singapore.
17. Oosterhaven, J 2019, *Rethinking Input-Output Analysis: A Spatial Perspective*, Springer Briefs in Regional Science, Springer, Cham, Switzerland.
18. SNA 2009, *2008 System of National Accounts*, European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank, New York, N.Y. (Available online at: <https://unstats.un.org/unsd/nationalaccount/sna2008.asp>).
19. Flegg, AT, Webber, CB, Elliot, MV 1995, "On the appropriate use of location quotients in generating regional input-output tables", *Regional Studies*, vol. 29, no. 6, pp. 547–561.
20. Flegg, AT, Webber, CD 2000, "Regional size, regional specialization and the FLQ formula", *Regional Studies*, vol. 34, no. 6, pp. 563–569.
21. Flegg, AT, Tohmo, T 2016, "Estimating regional input coefficients and multipliers: The use of FLQ is not a gamble", *Regional Studies*, vol. 50, no. 2, pp. 310–325.
22. Kronenberg, T 2009, "Construction of regional input-output tables using nonsurvey methods: the role of cross-hauling", *International Regional Science Review*, vol. 32, no. 1, pp. 40–64.
23. Tsekeris, T 2021, "The European value chain network: key regions and Brexit implications", *European Planning Studies*, vol. 29, no. 8, pp. 1495–1513.
24. Rodousakis, N, Soklis, G, Tsekeris, T 2022 "Mapping regional multiplier effects of the Greek economy", *Proceedings of the 22nd Conference of the Association of Greek Regional Scientists*, Grevena, Greece, pp. 86-95.
25. Tsekeris, T 2017, "Network analysis of inter-sectoral relationships and key sectors in the Greek economy", *Journal of Economic Interaction and Coordination*, vol. 12, pp. 413-435.