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Proposal for an Information System of the Greek Tourism Satellite Account

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Abstract

This paper gives a first look at the innovative Tourism Satellite Account (TSA) information system, which includes all the functions and procedures of updating the chain of TSA Tables, starting from data entry, storage and management of data, updating of TSA Tables, after the necessary statistical analysis, and finally the possibility of capturing the economic results of tourism activity in an economy.

The methodology applied allows the connection of the tables and the export of reliable and timely results. The proposed information system aims not only to improve the efficiency of tourism data management but also to facilitate their collection and ultimately the functionality and usefulness of TSAs.

The results expected from the proposed implementation will provide academics, professionals and tourism policy makers with new perspectives on the evaluation and improvement of tourism and on regional and national economic development (Wu, Liu, and Song, 2018). The TSA is integrated into the general information System of National Accounts (SNA).

The development of the Online Analytical Processing (OLAP) Tourism Satellite Account model, named "**OLAP- TSA-Model",** for integrating the data from the SNA Tables after the necessary processing and consideration of tourism data sources in the TSA tables, their transition from one TSA table to the next, to seamlessly complete them and reveal the values

of the economy attributed to the tourism activity of a country, are the subject of research of this paper.

Keywords: System of National Accounts, Tourism Satellite Account, Information System, Tourism, Greece.

Jel: E290, L830, O100, R150

Introduction

Tourism plays the most important role in the economic and social development of destinations around the world. Assessing its contribution to economic development is not only valuable to the government and industry of a destination, helping to formulate tourism policies and strategies, but is also essential for academics analyzing the economic impacts of tourism. The economic impact of tourism on a national economy cannot be conceptually determined based on other statistical frameworks other than those already internationally developed and accepted, mainly the System of National Accounts (SNA). Therefore, Tourism Statistics must be homogenized in a conceptual and methodological framework that will follow the principles of SNA, but in which there will be the possibility of further flexibility to rationally address the needs of tourism as an economic field, something that can be achieved by development of the national Tourism Satellite Account (TSA).

Tourism Satellite Accounts (TSA) are the most appropriate way to measure the economic contribution of tourism σsince it offers improved information for tourism policy development and economic impact assessments, both of which are important in guiding resources and support for new tourism infrastructure and individual events (Jones and Munday, 2008:53)

TSA has been recognized as the most important tool for measuring the contribution of tourism to destination economies. However, issues such as data collection, processing and registration lead to the delayed issuance of TSA, have limited their immediate practical application in some countries, while their results refer to much older years.

The T.S.A., calculates the consumption of both foreign and domestic visitors in each sector and derives tourism value added and other macroeconomic indicators based on the 2008 Systems of National Accounts (SNA 2008) of the United Nations (UN and UNWTO, 2010: 69).

The United Nations Statistics Division, the Statistical Office of the European Communities, the Organization for Economic Co-operation and Development and the United Nations World Tourism Organization (UNWTO) jointly published the Tourism Satellite Account: Recommended Methodological Framework 2008 (UNWTO, 2008, hereafter referred to as TSA: RMF 2008), which provides general guidelines for the development of national and regional T.S.A. worldwide (EU, 2013; 2019).

Because Tourism and other activities of the economy cannot be calculated in the National Accounts, and the reason is that Tourism consists of a set of branches and industries, while it does not appear as an independent sector of the economy in the National Accounts (since it is not a sector after all). For these reasons, the Methodological Tool of the Tourism Satellite Account was chosen.

In addition, tourism data is still underutilized in practice, for each government and industry, there is no systematic standard or framework for analyzing all the data in the T.S.A. tables (Frechtling, 2010).

Therefore, it is important and desirable to bridge the gap between academia and practice in terms of T.S.A development and applications.

This article introduces an innovative information system T.S.A. which integrates integrated functions in the entire T.S.A. training process chain, covering data entry, data storage and management, compilation of T.S.A tables, statistical analysis.

The system can efficiently store and manage data entry and automatically and regularly compile T.S.A. master tables per period / year and provides academia and industries with a new focus and direction for the development and use of T.S.A. The difficulties that have occurred worldwide for the implementation of the TSA relate both to the Methodological Framework and to the proper processing of the data that will be used.

The purpose of this article is the proposal for the creation of an information system, according to which the 10 Tables of the T.S.A. will be interconnected and automatically updated with the required data, through a database, which will receive the data and information from the competent sources, so that the economic mapping of tourism and its effects in a country is as easy, reliable and understandable as possible.

The presentation of the paper is organized in the following sections: In the 1st section, there is a literature review in Greece and internationally for the Tourism Satellite Account, in the 2nd section, the methodological framework and the proposed modeling of the Information System of TSA are presented. In the 3rd section the suggestions and the

corresponding conclusions are provided and finally in the 4th section the bibliography used is listed.

1. LITERATURE REVIEW OF T.S.A. DEVELOPMENT

About 60 countries of the 156 UNWTO member countries until 2010, have formed their national T.S.A., while Canada was the first country to launch a National T.S.A. system. in 1994. The first academic study of a TSA was by Nordström (1996), who focused on Sweden's TSA and found that tourism expenditure accounted for 4.5% of the country's gross domestic product (GDP) from 1992 to 1993.

The Canadian state remains the leader and has developed TSAs for its provinces and territories (Meis, 2014). Other countries that are well advanced with TSA projects include New Zealand, Australia, the USA and Mexico. Within Europe, there are several countries that are well advanced in TSA development and include Austria, Norway, Switzerland and Spain. In line with the European Commission's recent support for this, many other EU states are also in the process of developing TSA, and some nations are taking the TSA process further. Also, Spain and Norway have developed regional tourism satellite accounts (National Statistics Institute, 2004).

Some of the countries which prepare TSAs on regular basis are USA (Franks and Osborne, 2019; International Trade Administration, U.S. Department of Commerce, 2020), Canada, Australia (ABS, 2021), Brazil, New Zealand, Chile, Egypt, Italy, France, Japan, China, Croatia (Ivandic and Marušić, 2017), Philippines, Germany, Indonesia, Saudi Arabia, Serbia (Jovanović and Vukasovic, 2014)) South Africa, Spain, Thailand (National Council of Applied Economic Research, 2019). Other countries, like Croatia, are applying a specific determinist model that integrates symmetrical input-output tables and the tables of the tourism satellite account, to give an overview of the role of tourism in the economy (Ivandić and Šutalo, 2019:389). Even though France, Spain, Italy, Germany, and Greece, are considered the most attractive destinations amongst EU members, Croatia recorded a remarkable increase in tourist arrivals, revealing tourism as the most import engine of economic growth in the last decades (Kovačević Dragan (2020), and aiming to fully development of its national TSA.

The Tourism Satellite Account (TSA) method has been also applied to assess domestic tourism's status, comparing pre- and post-pandemic impacts of the COVID-19 on domestic tourism's economic contribution, and revealing that the direct contribution of domestic tourism to regional economy has fallen, while visitor composition by places of origin and in

industries' proportional contributions to tourism, has been changed. (Wu Doris Chenguang, Cao Chenyu, Liu Wei, Chen Jason Li. (2022)

Just recently, Tourism Satellite Account (TSA) has been also applied to subnational regions, examining to what extent regional TSA, contributes to better international comparability of tourism statistics, suggesting that data used might improve measurement of the economic contribution of tourism to regions (Frenț and Frechtling, 2022).

RESEARCH & DEVELOPMENT OF T.S.A. IN GREECE

The PhD thesis "Maritime Tourism: The assessment of its Impact on the Greek Economy through the Tourist Satellite Account and its connection with the National Accounting System". by Mihail Diakomihalis, is the only attempt to estimate the economic effects of tourism in Greece, with the application of the Tourism Satellite Account method (Diakomichalis 2006). Before the completion of the Dissertation, some related articles were published, such as: “Possibilities of developing a Greek tourism satellite account”, by Lagos and Diakomihalis (2005), presented in the 1st International Conference on Tourism Development & Planning.

Some studies published thereafter were concentrated to the application of the TSA and publication of results for specific forms of tourism in Greece, such as: “The contribution of maritime tourism to total employment in Greece. presented by Diakomihalis M. (2008) in the 7o International Conference- European Economics and Finance Society (EEFS) , and “A Tourism Satellite Account assessment of the impact of Cruise industry on the Greek economy” presented by Diakomihalis and Lagos (2009) in the 4th International Conference of the Aegean University, The Impact of Maritime Tourism on the Greek Economy via the Tourism Satellite Account Diakomihalis, 2007), Estimation of the economic impacts of yachting in Greece via the tourism satellite account (Diakomihalis and Lagos, 2008), Maritime Tourism Tax Revenues in Greece: A New Framework for Collection (Diakomihalis, 2012).

At the same time, two more Doctoral Theses were prepared and published: The first by Giannopoulos (2010) entitled "Satellite Account of Tourism. Theory and practice of a National Accounting Tool & the Greek Approach", and the second by Hatzimarinakis (2011), entitled “Regional Tourism Satellite Accounts. General Theory - Methodology & Rearrangements for the Greek Case".

In 2012, Giannopoulos and Diakomihalis published the one and only book in the Greek bibliography, entitled “Tourism Satellite Account: The National Accounting of Tourism and an empirical application in Greece”. The same authors have presented a relevant conference

paper “The Statistical-Accounting System of Tourism: Tourism Satellite Account and National Accounting System” in the 4o National Conference of Natural Sources and Environment Economics in 2016, and at the same year Giannopoulos and Boutsinas (2014) published the paper “Tourism Satellite Account Support Using Online Analytical Processing”. Recently, Hatzimarinakis and Hackl (2018) have published the research “Pilot Tourism Satellite Accounts for Greece: Results, Issues and Needs”, revealing “how important it is for the tourism analysis to properly measure all the elements included in the tourist consumption and to deal separately with overnight and same-day visitors, parameters that are not yet taken into account in the current practice of Greek tourism statistics”.

Almost all the above-mentioned papers are dealing with the need to develop the Greek Tourism Satellite Accounts (TSA), emphasizing either to methodology or to proper data sources or even to provide a pilot program of TSA application for Greece, as one of the EU countries having not developed yet a TSA. The common wind-up of all research is the need for a practical and reliable software, fulfilling the TSA: RMF framework and guidelines, to become essential information tool and policy making instrument for Greece. The present paper aims to develop and propose this unique Information Model.

2. METHODOLOGY OF THE DATA MODELING OF THE T.S.A. INFORMATION SYSTEM.

Although many countries that implement their own TSA have successfully addressed these issues, they have not been able to introduce an integrated information system into the TSA database, in which data will be entered once from the appropriate sources and after the required configuration, so that the automated updating of the TSA Tables from a general Data Input table, to conclude and attribute the effects of Tourism on the economy of a country.

The 10 tables within the Tourism Satellite Account (TSA) store a significant amount of data. These data when analyzed are able to support significantly more statistical analyses. However, sophisticated software is required, not only to efficiently process and access the data, but also to efficiently extract the information required in a friendly, consistent, and efficient manner. This empowers researchers and tourism operators in the use of tourism statistics and thus supports future research and decision-making. To achieve this, we have developed a Tourism Information System application using **Online Analytical Processing (OLAP),** the “**OLAP- TSA-Model”,** based on off-the-shelf commercial software to ensure global access. In addition, through the OLAP process, we explore TSA information in depth and identify extensive methodological and/or theoretical issues of TSA. Thus, we discuss future research and development of the TSA framework guided by the TSA-OLAP model.

The main functions of the **OLAP- TSA-Model** include: the data collection unit, the data management unit, the TSA collection unit, the statistical analysis unit and the extended section of individual applications.

Figure 1: The **OLAP- TSA-Model** structure

Data Collection & Data Management Unit:

The goal of **OLAP- TSA-Model** is to reduce the time and financial cost of data collection. Data is collected from various sources, online and offline surveys and supported by the system. National accounts data and other tourism-related data can also be uploaded to the system. All data is stored in the data management database. Two databases have been built for this system. The first is used as a routine server and the second is a backup. After the data is uploaded to the system, the data quality is checked and any outliers or other types of anomalies are detected.

TSA Collection Unit:

The TSA construction is harmonized with the the international standard TSA: RMF 2008, which consists of 10 output tables.

Table 1 records the tourism expenditure generated by inbound visitors in categories by product. In a regional TSA (Jones and Munday, 2010), in addition to international tourists, non-local domestic visitors from other regions of the country are identified as external visitors, and their tourism expenditures are also described in Table 1.

Table 2 focuses on domestic tourism expenditure categorized by product. In a regional TSA, this refers to regional tourism spending by residents of that region.

Table 3 presents outbound tourism expenditures. Similarly, in a regional TSA, both outbound visitors and domestic visitors traveling outside the region are considered separately in Table 3. Based on Tables 1 to 3, domestic tourism consumption is aggregated in Table 4 to show tourism output from the demand side.

Table 5 presents the production accounts of the tourism and other industries in the reference economy.

Table 6 is the main result of regional TSA. By merging the results of Tables 4 and 5, Table 6 reports the direct economic impact of tourism industries. Table 6 also includes the gross value added attributed to tourism in each sector.

Tables 7-10 report employment in tourism industries, tourism gross fixed capital formation, collective tourism consumption and some non-monetary indicators. Although these 10 tables are recommended by TSA: RMF 2008, they are rarely fully aggregated by destination due to data availability issues and resource limitations.

The first four TSA tables are the most basic and contain demand-side data on visitor spending (before and during their trip) and tourism consumption. In the proposed I.S. TSA, once the basic data is entered from both the demand side and the supply side, the corresponding amounts, especially for Tables 1 to 6, are automatically complied with, which not only improves efficiency but also establishes consistent principles and rules collection to ensure the comparability of TSAs in different spatial and temporal dimensions. This section is the foundation and key outcome of the proposed I.S. TSA.

Statistical Analysis Unit:

TSA's training process provides meaningful data and relevant statistics. In addition to the output tables, the data used in the intermediate calculation processes are also useful for practitioners. For example, in conjunction with a geographic information system (GIS), the system can spatially decompose visitor arrivals and spending data. Analyzes of the geographic distribution of tourism data are essential for government and industries to effectively allocate resources in different periods to improve the travel experience of visitors to the destination. In addition, the analysis of tourism consumption can allow the destination to determine the preferences of visitors for certain tourism goods and services.

Extended section of individual applications:

Outputs from TSAs can be used for more advanced functions. By introducing different multipliers for each sector, the indirect and induced effects of tourism on output, value added, and employment can be obtained. The **OLAP- TSA-Model** can also be used to predict not only future visitor arrivals and their total expenditure but and for tourism consumption in various sectors such as accommodation, catering and transport.

The following is a list of observations and highlights that are quite important, where through them the necessity of several required actions for the implementation of the proposed information system emerges. These observations are in line with the Recommended

Methodological Framework (TSA: RMF 2008). The 2008 Tourism Satellite Account: Recommended Methodological Framework (TSA: RMF 2008), is the result of significant efforts dating back to the late 1970s.

These recommendations represent an update of a common conceptual framework for the design of the Tourism Satellite Account (TSA), originally created in 2000 by an Undersecretariat Working Group convened by the United Nations Statistical Division (UNSD), with the participation of the Statistical Service of the European Communities (EUROSTAT), the Organization for Economic Co-operation and Development (OECD) and the World Tourism Organization (UNWTO).

Table 1. Structure of the TSA Tables in the **OLAP- TSA-Model**

TABLES OF TSA	NUMBER OF FELDS	NUMBER OF PARENT FILEDS	NUMBER EXTRENAL LINKING FIELDS	NUMBER CALCULATED FIELDS	NAMES OF COLUMNS TSA TABLES	FIELD NAMES ON DATABASE INFORMATION SYSTEM
TSA1	3	3	0	1	1.1, 1.2, 1.3	1_1, 1_2, 1_3
TSA2	9	9	0	5	(2.1), (2.2), (2.3), (2.4), (2.5), (2.6), (2.7), (2.8), (2.9)	2_1, 2_2, 2_3, 2_4, 2_5, 2_6, 2_7, 2_8, 2_9
TSA3	3	3	0	1	(3.1), (3.2), (3.3)	3_1, 3_2, 3_3
TSA4	5	3	2	2	(1.3), (2.9), (4.1), (4.2), (4.3)	4_1, 4_2, 4_3, 4_4, 4_5
TSA5	17	17	0	1	(5.1), 5.1α), (51β), (5.2), (5.3), (5.4), (5.5), (5.6), (5.7), (5.8), (5.9), (5.10),	5_1, 5_2, 5_3, 5_4, 5_5, 5_6, 5_7, 5_8, 5_9, 5_10, 5_11, 5_12, 5_13, 5_14, 5_15, 5_16, 5_17

					(5.11), (5.12), (5.13), (5.14), (5.15)	
TSA6	23	8	15	3	(5.1), " ", (5.1α), " ", (5.1β), " ", (5…), " ", (5.13), " ", (5.14), " " , (5.15), " " , (6.1), " " , (6.2), " " , (6.3), " " , (6.4), (4.3), (6.5)	6_1, 6_2, 6_3, 6_4, 6_5, 6_6, 6_7, 6_8, 6_9, 6_10, 6_11, 6_12, 6_13, 6_14, 6_15, 6_16, 6_17, 6_18, 6_19, 6_20, 6_21, 6_22, 6_23
TSA7	19	19	0	6		7_1, 7_2, 7_3, 7_4, 7_5, 7_6, 7_7, 7_8, 7_9, 7_10, 7_11, 7_12, 7_13, 7_14, 7_15, 7_16, 7_17, 7_18, 7_19
TSA8	17	17	0	1	(8.1), (8.1α), (8.1β), (8.2), (8.3), (8.4), (8.5), (8.6), (8.7), (8.8), (8.9), (8.10), (8.11), (8.12), (8.13), (8.14), (8.15)	8_1, 8_2, 8_3, 8_4, 8_5, 8_6, 8_7, 8_8, 8_9, 8_10, 8_11, 8_12, 8_13, 8_14, 8_15, 8_16, 8_17
TSA9	5	5	0	1	(9.1, (9.2), (9.3), (9.4, " "	9_1, 9_2, 9_3, 9_4, 9_5
TSA10a	9	0	0	3		10_1, 10_2, 10_3, 10_4, 10_5, 10_6, 10_7, 10_8, 10_9
TSA10b	2	2	0	0		11_1, 11_2
TSA10c	5	5	0	0		12_1, 12_2, 12_3, 12_4, 12_5
TSA10d	10	10	0	1		13_1, 13_2, 13_3, 13_4, 13_5, 13_6, 13_7, 13_8, 13_9, 13_10

Table 2 - New structure in the **OLAP- TSA-Model** – In an MS-Access environment (table design)

FIELD NAME	FIELD DATA TYPE	FIELD DESCRIPTION
ID	Number	Record counter
1_1	Number	Numeric field values
1_2	-------- // ----------	-------- // ----------
1_3	-------- // ----------	-------- // ----------

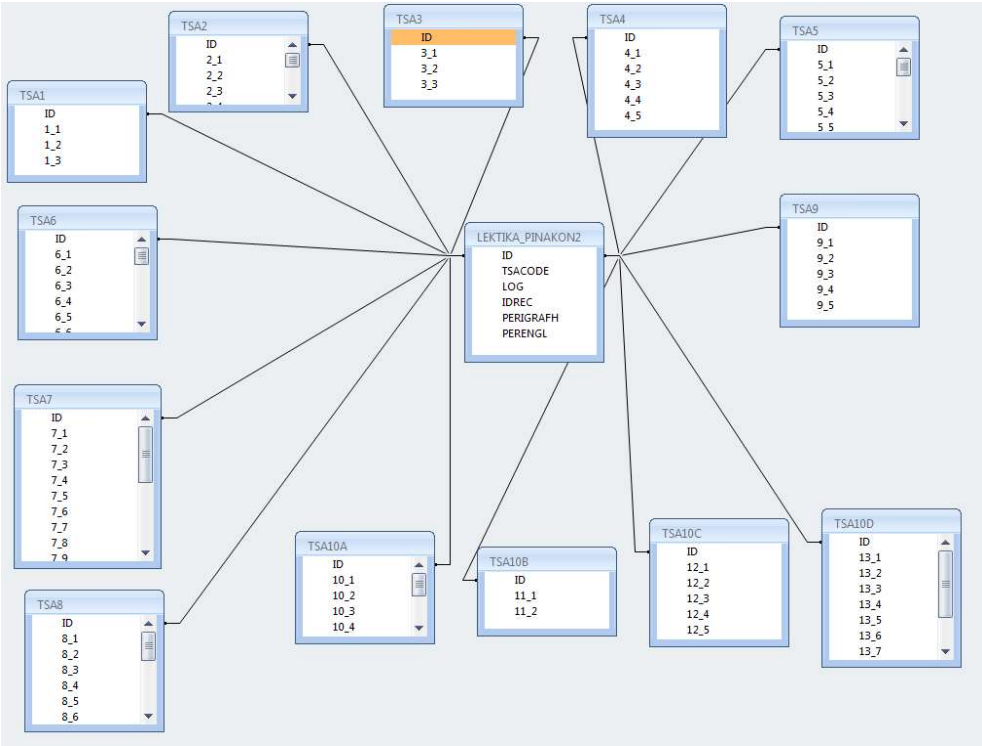

Figure 2 – C. CORRELATION DIAGRAM OF T.S.A. TABLES

3. CONCLUSIONS

This article proposes a TSA information system which will be based on a Local Application, and which can solve all the problems and improve the efficiency and practical application of a TSA. This system is particularly valuable to government and industry decision makers. Based on the results of the system, it will be possible to publish tourism data and information about the economic contribution of tourism to the country. The system also offers advantages in terms of being user-friendly, integrated and easy to manage, which improves the efficiency of TSA deployment and use. The **OLAP- TSA-Model** will be an effective way to bridge the gap between the theoretical development of TSAs and their empirical application in different case study areas by different stakeholder groups.

It covers all the important points related to the TSA drafting process chain, namely data collection, data storage and management, statistical analysis, annual TSA usage, as well as other extensive future applications, and it greatly improves the drafting efficiency TSA and the

implementation of TSA in destinations / areas where tourism plays an important role in the economy.

The **OLAP- TSA-Model** will provide an ergonomic environment for the continuous and timely collection of TSA data, where different data sources will be efficiently imported and organized in a platform with TSA tables. with the ability for users to be able to access data and information at any time.

The **OLAP- TSA-Model** will advance the state of the art in terms of TSA development and go at least some way to bridging the gap between academic knowledge and practice in the field of tourism finance.

In the mentioned Dissertations of the 1st Unit, we clearly see that only a methodological approach and analysis is made, without any further reference to any future implementation of an automated system, which may have the ability to give answers very quickly, through special procedures.

Also taking into account all previous methodological analyses, of all Greek Dissertations, as well as the International Bibliographies, which exist towards the end of the proposal, it is proposed to create & implement a new system, which will be fully secure electronic / computerized and efficient, hoping to complement and complete, the whole range of the investigation of the subject, which concerns the Tourism Satellite Accounts.

The main objective of the proposed electronic system will allow the introduction of the statistical tables and also give results about the TSA, in an automated way.

It will store the entire process of the investigation for each period of Use - Calculation of TSA (Annual Inflows & Outflows of TSA tables), safely and will make the search of the data easier and more efficient. It will have the ability to effectively evaluate tourist data - expenses, so that enough time will be saved.

The system administrator will prepare the necessary procedures for each annual TSA use (Opening a New Use / Year of TSA data), so that the data is in separate Entities / Tables, and the necessary interconnection between them, to avoid accidental mistakes but also the guarantee of issuing results safely.

Ordinary authorized users (clients) will be able to connect through their computers, in a local network, with their provided code, which has been given to them, and will be able to get the results they want through various parameters, which will have been created initially in the proposed system by the authorized administrator.

Thus, the processing and analysis of the results will be immediate and will be done by the system with significant time savings.

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