World Tourism Organization

Exploring the Full Economic Impact of Tourism for Policy Making

Extending the Use of the Tourism Satellite Account through Macroeconomic Analysis Tools

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under the supervision of UNWTO Statistics and Tourism Satellite Account (TSA) Programme
distributed on the occasion of the T.20 Ministers' Meeting in Paris – October 2011

Executive Summary

The Tourism Satellite Account (TSA) is a unique tool now available to policymakers in many countries to document the direct Gross Domestic Product (GDP) and employment contributions of tourism to national economies.

Policymakers are also interested in estimating other aspects of the economic impact of tourism by using TSA data to estimate the income and government revenue generated by Tourism Consumption and incorporating the secondary effects of this spending on the economy. These secondary effects "multiply" the impacts of tourism through engaging additional suppliers and households in servicing Tourism Expenditure. Moreover, policymakers seek to understand how external and policy-induced "shocks" to the economy will affect tourism's contributions.

Three macroeconomic analysis tools are available for policy-makers to extend the understanding of the economic benefits of Tourism Expenditure: the Input-Output Model, the Social Accounting Matrix and the Computable General Equilibrium Model. This paper summarizes each of these in turn, describes their relationships, discusses strengths and weaknesses, and suggests how TSA data can be used as input in deriving estimates of the overall economic impact of tourism. Such analysis is the precondition for an accurate understanding of tourism as part of a national economy, enabling the integration of tourism into broader economic policy.

Table of Contents

I. Introduction

The purpose of this paper is to discuss the macroeconomic policy analysis tools available to extend the value of the Tourism Satellite Account in a country to inform public policy officials of the implications of changes in tourism demand for their residents, businesses and government units. It also addresses methods of analyzing changes in tax rates, government expenditure programs, and other actual and potential public policies that affect tourism demand in the country and the resulting economic benefits. It summarizes the characteristics of four major macroeconomic analysis tools and compares their contributions to policy analysis. These tools are the Tourism Satellite Account, the Input-Output Model, the Social Accounting Matrix, and the Computable General Equilibrium Model,

II. Basic Terms

It is important here to establish basic terminology covering what these modeling tools aim to accomplish. There is no international consensus on the basic terms used in exploring the contributions of tourism to a national economy or the economic implications of "shocks" to that economy. Shocks here should be understood to mean sudden, sizable changes in variables that affect the national economy, including (from the tourism perspective) increased visitor spending generated by a special event, rises in the prices of transportation and other items essential to traveling away from home and changes in exchange rates with origin markets of international visitors, to name just a few. Some of these shocks will be changes in public policies affecting tourism demand, such as higher tax rates on accommodation services. The following terms and definitions are suggested to encourage a consensus on terms, to facilitate discussion of measuring the impact of Tourism Demand on a country and its economy.

Tourism Economic Consequences: the comprehensive term including all economic effects, both positive (benefits) and negative (costs), both direct and secondary, produced by visitors, their consumption expenditures and the reaction of business firms, non-profit organizations and government agencies to visitors and their activities in a national economy.

Tourism Economic Contribution: the direct, positive effects of Tourism Consumption, Tourism Gross Fixed Capital Investment and Tourism Collective Consumption on a national economy. This includes the Tourism Satellite Account (TSA) measures of Tourism Direct Gross Value Added, Tourism Direct Gross Domestic Product (GDP), and Employment in the Tourism Industries consistent with the System of National Accounts. Other measures of direct contributions to the national economy include compensation of employees, gross operating surplus, and government revenue.

Tourism Economic Benefits: Tourism Economic Contribution plus the secondary effects (including both "indirect effects" and "induced effects") on the national economy.

Total Tourism Internal Demand (or "Tourism Demand" in this paper): as suggested for the TSA, the sum of Internal Tourism Consumption, Tourism Gross Fixed Capital Formation, and Tourism Collective Consumption. At the current time, for the sake of international comparability, UNWTO recommends limiting the measurement of Total Tourism Internal Demand to Tourism Consumption. The two other items covered by the concept – Tourism Fixed Capital Formation and Tourism Collective Consumption – can be added at a later time.

Tourism Economic Impact: the sum of the direct and secondary effects of Tourism Consumption and other elements of Total Tourism Internal Demand on the national economy. While the TSA does not include secondary effects, this recognizes that many tourism studies have focused on these variables through complementary methodologies discussed in this paper.

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1

Tourism Expenditure: as defined in the TSA, the amount paid for the acquisition of consumption goods and services, and valuables, for visitors' own use or to give away, during tourism trips. It includes monetary expenditure by visitors themselves, as well as by others on behalf of visitors (e.g., corporate spending on business travel). The latter include monetary expenditures by employers for business travel, and by governments and Non-profit Institutions Serving Households on subsidizing costs to visitors; this item is synonymous with "visitor spending" in this paper.

Tourism Consumption: as defined in the TSA, equals Tourism Expenditure plus imputed values of services provided to visitors (e.g., exchanging vacation dwellings, lodging in own vacation homes, food and lodging provided by friends or relatives to visitors, free travel-related services provided by employers and government expenditures benefiting visitors).

A complete Glossary of UNWTO terms relating to tourism appears as the Appendix to this paper.

III.   The Tourism Satellite Account

The single most important new macroeconomic policy analysis tool developed in the last decade to measure tourism demand and its implications for a national economy is the Tourism Satellite Account.

The Tourism Satellite Account, or TSA, is a distinctive method of measuring the direct economic contributions of Tourism Consumption to a national economy. Its unique approach derives from employing the principles and structure of the internationally-adopted System of National Accounts (SNA) to measuring the direct economic impact of tourism. The TSA comprises a set of inter-related tables that show the size and distribution of the different forms of Tourism Consumption in a country and contributions to GDP, employment and other macroeconomic measures of a national economy.

When analyzed, the term, "Tourism Satellite Account", indicates the essence and uniqueness of this new analytical tool. First, the TSA deals with a distinctive set of human activities defined as "tourism" – the activities of visitors (travelers taking trips to destinations outside their usual environment for less than one year for any purpose other than being employed by a resident entity in any countries visited).

The TSA is "satellite" to a larger body, the System of National Accounts promulgated in 2008 by the United Nations, the World Bank, the International Monetary Fund and other respected international economic organizations. The System of National Accounts in a country is based upon the widely accepted System of National Accounts 2008 (SNA 2008) "a statistical framework that provides a comprehensive, consistent and flexible set of macroeconomic accounts for policymaking, analysis and research purposes" (Ibid. p. iii).

Finally, the TSA is an "account", that is, a table or set of tables that records, for a given aspect of economic life, the transactions, sources and uses of resources of institutional units and sectors. By combining these three elements, the TSA approach is unique among the methodologies available for measuring the economic consequences of tourism. The balance of this paper explores how the analytical value of the TSA can be extended through other existing tools for macroeconomic policy analysis.

2

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A.   Policymakers' Interests in Tourism

National legislators and government administrative officials have broad responsibilities regarding their national economies. In general terms, they seek to grow the national economy to increase the number of jobs and expand the income associated with these without significant increases in general price levels. They can pursue these objectives by, among other activities, stimulating Tourism Demand, improving operating conditions for the nation's tourism industries, and adopting other policies that grow Tourism Economic Impact. They do this by considering the following effects of public policies, among others:

- Benefits of investing in tourism promotion
- Benefits of investing in visitor facilities
- Benefits of investing in tourism-related infrastructure
- Importance of salutary visitor policies
- Effects of regulatory policies on tourism businesses
- Value of partnerships with business
- Returns on investment in tourism development
- Benefits of international efforts and cooperation to grow tourism worldwide

Employing their country's Tourism Satellite Account along with other macroeconomic policy analysis tools can assist them in making optimum decisions in pursuing their goals.

B.   Boundaries of the Tourism Satellite Account

The TSA is the most valid method of measuring the size of the Tourism Economic Contribution to a country. It is based on observed values of visitor consumption of specific products produced by specified tourism industries, producing contributions to a nation's Gross Domestic Product and employment. These are among the so-called "direct" or "primary" effects of tourism demand on the national economy.

Other measures of tourism's direct contributions to a national economy include labor compensation, gross operating surplus of enterprises and government revenue directly generated by Tourism Consumption. These require extending the TSA through other macroeconomic analysis tools discussed in this paper.

Moreover, there are other economic consequences of the interactions between Tourism Demand and tourism supply beyond the direct effects. One set of these is called the "secondary impact of tourism demand". This includes the "indirect effects" of Tourism Demand, recognizing that as a nation's productive units buy and sell from one another ("interindustry transactions") in response to Tourism Consumption, they produce business receipts, jobs and income. These are in addition to the amount produced directly by tourism demand and captured so well in the TSA.

The other element in the secondary impact of tourism results from the jobs and labor earnings associated with serving tourism demand. For example, in order to serve visitor demand, hotels and restaurants must hire workers. This generates income for these employees in the way of wages, salaries and employment benefits. This income is spent by its recipients to purchase consumption items, generating additional business receipts, interindustry transactions, jobs and income. These are captured by estimating the "induced effects" of the initial visitor spending.
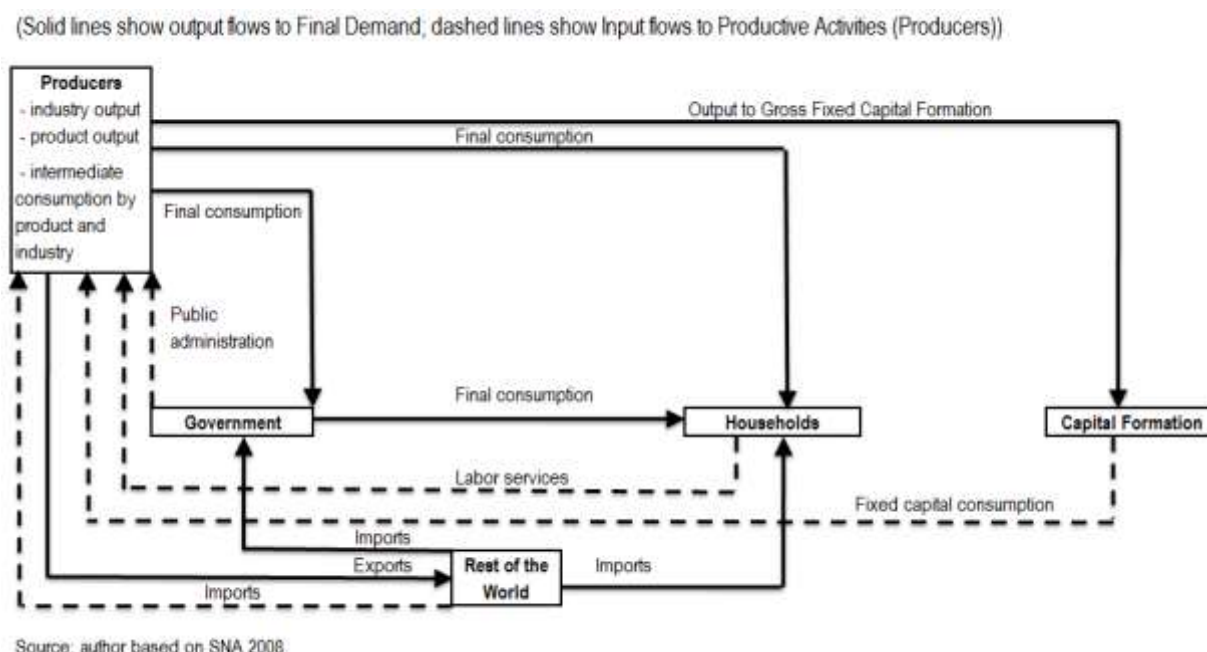
By design, none of these are captured in the Tourism Satellite Account. Estimating secondary effects requires moving from defining and populating accounts to designing and implementing economic models. An "economic model" is a simplified representation of an economy that attempts to identify the major variables and relationships among them, array them in equations and use them to estimate macroeconomic variables that cannot be observed directly. It is the product of assumptions held by the model builders about the important relationships in the world that produce salient results. We now examine the three popular types of macroeconomic models currently used to explore the secondary effects of shocks to national economies (such as increased visitor spending or new macroeconomic policies): the Input-Output Model, the Social Accounting Matrix and the Computable General Equilibrium Model.

IV.   The Input-Output (I-O) Model

The first model developed years ago to assess the secondary impact of shocks to a national economy, tourism or otherwise, is the Input-Output (I-O) Model.

The I-O Model is based upon an Input-Output Table constructed from the Use Table from a country's System of National Accounts. The SNA Use Table has three quadrants. One (the northwest quadrant) shows the products (rows) supplied to industries (columns), presenting the intermediate consumption of products by industries in order to produce output for final demand (i.e., the demand of households, for business investment, of governments and for export). The northeast quadrant next to it presents the consumption of each product (row) by the sectors of final demand. Finally, the southwest quadrant presents value added in terms of income earned by employees, gross operating surplus of firms, taxes less subsidies on production and imports and consumption of fixed capital. Figure 1 displays the flows among producers, Households, Government and other elements embodied in the I-O Table.

Figure 1: Flows in the Input-Output Table

(Solid lines show output flows to Final Demand; dashed lines show Input flows to Productive Activities (Producers))

Source: author based on SNA 2008

As SNA 2008 explains (chapter 28), we can substitute industries for the rows in the northwest and northeast quadrants of the Use Table to produce an Input-Output Table. This table presents every industry in the country in the rows supplying output to every industry in the columns. Consequently, it

4

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has been called the "interindustry matrix" because it shows the flows of output from each industry to each industry in the country. Comparing a TSA's measure of Tourism Direct Gross Value added by industry to Total Gross Value Added in the southwest quadrant of the Input-Output Table, we can derive compensation of employees, direct operating surplus, and a measure of government tax revenue directly generated by Tourism Consumption in the country.

So far, we have utilized the Input-Output Table as an account. With some transformations, this account can be turned into a very useful model: the Input-Output Model. We can produce another account from the Input-Output Table, sometimes called the "direct requirements table," by simply substituting for each cell in the Use Table the ratio of the value in the cell in the input-output table to the total for the entire column (i.e., industry). The direct requirements table, then, shows for each purchasing industry (in the column) the inputs directly required from different supplier industries (in the rows) to produce one unit of output. Through matrix algebra manipulation (called "matrix inversion") of this direct requirements table, we derive the "total requirements table". At this point, we have moved from an account to a model, the Input-Output (I-O) Model. This model computes, for any increase in consumption of a given industry's output, the total amount of intermediate output required. And this model can be used to compute the secondary effects of visitor spending in the economy described above. These are often summarized in the "Multiplier Concept."

A.   The Multiplier Concept

Economists have proposed a number of "multipliers" to summarize the primary and secondary effects on total output of an increase in demand for products, such as from additional visitors purchasing them. One of the most popular is the "type I output multiplier". It is the ratio of the total output produced in the national economy to the increase in Tourism Expenditure. This total output is created as producing units (e.g., business firms) buy and sell from one another in order to produce additional units of the products consumed by visitors. And the additional economic impact that results as businesses buy and sell from one another is the "indirect impact".

So far, our I-O model represents the additional value produced in our economy by its productive units (mostly business firms) to service the Tourism Expenditure on goods and services: the Type I output multiplier. We can derive the "Type II output multiplier" by adding the Household sector as a column to our direct requirements table. By doing so, we are considering households as a sector requiring certain product inputs (i.e., personal consumption items) and producing labor services as its output. So now we have an expanded direct requirements table incorporating Households. The sum of the Household column is Personal Consumption Expenditure for the year, and each cell in it represents consumption of a particular good or service, just as in the initial use table for producing units does.

When we invert this expanded direct requirements matrix, we obtain a total requirements table that now includes Household consumption. This additional impact on the output of goods and services results as the income generated for certain households by Tourism Expenditure stimulates additional personal consumption expenditures and is the "induced impact". This new ratio of the increase in total output in response to serving Tourism Expenditure to the initial consumption expenditures is called the "Type II Output Multiplier". It is necessarily larger than the Type I Output Multiplier by virtue of including Households as a productive and consuming sector. The sum of the indirect impact (from interindustry transactions in the economy resulting from the Tourism Expenditures) and the induced impact (from recognizing Household spending in the economy stimulated by the wages and salaries generated by the Tourism Expenditure) is the "secondary impact". This distinguishes it from the direct impact of the initial Tourism Expenditure on the output of industries captured in the TSA.

We can derive other multipliers from the I-O models, all computed by dividing the impact measured in various units by the initial Tourism Expenditure:

- Type I income multiplier = employee compensation generated for households through the indirect impact for each currency unit of expenditure;

- Type II income multiplier = employee compensation generated for households through the indirect impact plus the induced impact for each currency unit of expenditure;

- Type I employment multiplier = number of jobs generated by the indirect impact for each one million currency units of expenditure;

- Type II employment multiplier = number of jobs generated by the indirect plus induced impact for each one million currency units of expenditure.

B. Contributions to the Macroeconomic Analysis of Tourism

A country's Input-output model can produce estimates of the output, income and employment multipliers for Tourism Expenditure for the relevant year. Such multipliers can be compared to other types of consumer expenditure, such as on automobiles and other consumer products, government expenditures on military bases and other facilities, and investment in infrastructure construction and maintenance. This assists policymakers in determining the total effects of public policies to expand Tourism Expenditure compared to alternative economic development programs.

In addition, the Input-Output table displays linkages between tourism industries producing for Tourism Demand and the industries supplying intermediate goods and services to those industries. If a country finds, for example, that the accommodations industry is purchasing a great deal of its intermediate products from abroad (say, furniture and equipment), it can increase the macroeconomic contribution of serving accommodations demand by encouraging domestic enterprises to produce these items. This will reduce the leakages of demand to industries in other countries and increase the multiplier impact of Tourism Expenditure.

C. Boundaries of I-O Modeling

As in any modeling exercise, I-O models depend upon the assumptions incorporated in them. One limitation of the I-O analysis is that no supply constraints are built into the model. That is, it is assumed that the required number of units of input products are always available to produce any amount of additional output of an industry. In the real world, we would expect, as visitor expenditures rise, at some point there will be a shortage of input units available at the original price (think fuel or water or labor) to service additional increases in visitor spending. When this occurs, wages and other prices must rise, which will constrain demand and affect interindustry relationships throughout the economy that will not be captured in the I-O model.

Another unrealistic assumption is that I-O models assume constant returns to scale. That is, they assume that it will always take the same volume of inputs to produce one unit more to satisfy increased in visitor spending. In the real world, the returns for each additional input unit may initially rise (called, "increasing returns to scale") but eventually decline: more units of the inputs are required to produce each additional unit of food service, lodging, etc., in response to increased Tourism Expenditure. Neither increased returns to scale or decreasing returns are incorporated in the I-O model.

6

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A third weakness of the I-O model is the assumption of a fixed input structure for each industry. That is, a hotel will always require the same ratio of expenditures on linens, labor and other items to service each additional $1 million in visitor spending. In the real world, producers are constantly substituting inputs to reflect availability and prices. This most often shows up when a producer decides to import an input he formerly purchased from surrounding suppliers. So the input structure of an operating economy is constantly varying, affecting output and incomes. This is not reflected in the I-O model

A fourth shortcoming is that I-O modeling assumes fixed output ratios among products produced by an industry. If the lodging sector of a country shows seventy percent of its output is lodging and thirty percent is food service when the Use Table was constructed, this ratio continues to prevail as visitor spending increases or declines. In the real world, industries vary their output mixes depending on prices, costs and the characteristics of consumer demand.

The net effect of these four unrealistic assumptions tend to be multipliers from I-O Models that are overstated when dealing with sizeable external shocks. However, the I-O multiplier estimates for most countries appear to be reasonable when the size of the shock is not too large.

Finally, I-O models do not provide detail on producers below the industry level, or on different types of consumers. If we want to assess the effects of changing tourism demand on small/medium sized enterprises, or low-income workers, or various occupations, the Input-Output Model cannot help us. Social Accounting Matrix models have been developed to produce such analyses.

But there are advantages to developing and using I-O models that continue to make them popular today. For one, the structure of, and data required for, I-O models are well-understood and widely accepted. There is no question about how an I-O model must be constructed: it is specified in SNA 2008. Indeed, Archer (1982) marks the first comprehensive exposition of I-O multipliers for tourism analysis, and studies continue to be published using these techniques 30 years later.

A second advantage is that a number of countries routinely produce Use Tables every 5 years or so. So the data necessary to develop the I-O models for secondary impact analysis are always available, albeit with a moderate lag.

V.   The Social Accounting Matrix (SAM)

The Social Accounting Matrix (SAM) is an extension of I-O modeling. It adds to the I-O structure by presenting more transactions in the national economy in greater detail. However, unlike the I-O model, there is no single structure or presentation universally recognized. Rather, SAMs are constructed for individual purposes to disaggregate relationships among suppliers, purchasers, and factors of production. Specifically, a SAM can elaborate the institutions purchasing or supplying goods and services: business firms, households and governments. For example, the Household sector might be disaggregated to distinguish households by race, income, and whether male or female headed. And the business sector might be broken down in size categories (e.g., small, medium and large sized enterprises). Finally, the markets for factors of production might distinguish labor by occupations and capital by sources.

Figure 2 presents a sample Social Accounting Matrix. By comparing this to Figure 1, the reader can see how some institutions (e.g., Households, Producers) have been disaggregated and markets have been added.

Figure 2: Example of Flows in a Social Accounting Matrix
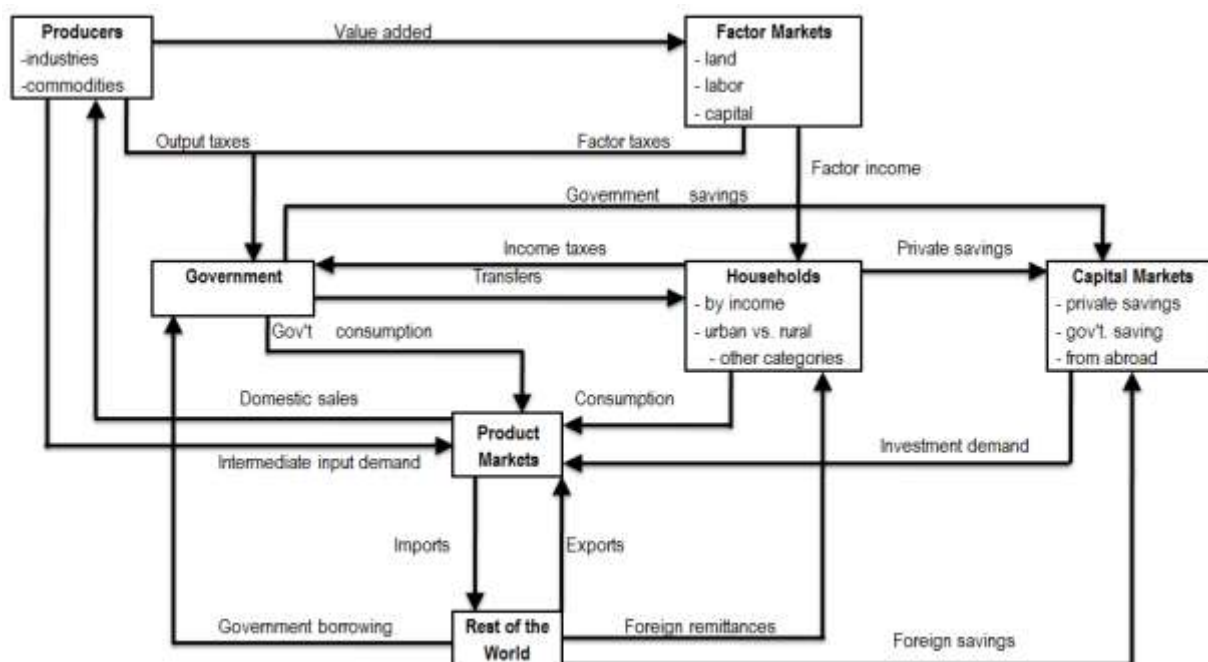
Source: after Round (2003), p. 20.

A SAM can show how each component (productive units elaborated in the I-O model, Households and other institutions and factors of production) interacts with others in terms of products sold and income received:

1. Flows between institutions and productive units: the productive units supply goods and services to firms as intermediate inputs, and to households and governments to satisfy final demand. In return, the productive units receive payments from the purchasers.

2. Flows between productive units and factors of production: the productive units purchase factors of production of labor and capital. In return, they make labor compensation, interest and rent payments to these factors.

3. Flows between factors of production and institutions: households provide labor, households, firms and governments provide capital. In return, they receive labor compensation, operating profits, interest and rent payments.

A more complete SAM will distinguish six accounts and their relationships (Isard, et al., 1998):

1. Production account: as presented in the I-O table
2. Factors of production account: labor and capital sub accounts
3. Institutions: households, firms and government disaggregated by income level, size and other characteristics required by the analysis
4. Government account
5. Combined capital account: receives savings from institutions and distributes them to investment
6. Rest of the world account: imports, exports and imports of final products, intermediate products and capital. It is here where the Balance of Payment "travel" item related to both outbound "travel" (imports) and inbound "travel" (exports) for the country are represented.

The result of this additional complexity in the tables is enhanced analytical capabilities. If we want to understand what types of households (e.g., poor, female head, children present) benefit from increased Tourism Expenditure, we can elaborate the sector through surveys to show households by the disaggregated categories we have collected data on. And we can compare government spending to attract more visitor spending in order to alleviate poverty, for example, with spending the same amount to attract a new manufacturing plant or improve energy and communication infrastructure in order to reduce poverty.

And a properly built SAM can indicate the secondary effects in terms of transactions, employment and income for different types of households, different types of enterprises and different types of products purchased by visitors. Moreover, multipliers can be produced analogous to those from the I-O model but including more demand and supply detail. This expands the information available to policymakers about who benefits from increased visitor spending, prospective public policies or other shocks.

A. Boundaries of the SAM

There are boundaries associated with SAM modeling. Since they are expansions of the Input-output model, they are subject to the first four boundaries identified for these above. Another constraint is that the required input data, matrix structure, and characteristics of the outputs are not standardized. Researchers building SAMs have much more leeway on what they include and how the relationships are specified than I-O developers do. So it is difficult to compare SAMs for different countries with one another. Moreover, the data requirements for the SAM are significantly greater than for I-O tables and models. It is likely that the research required for disaggregating households is not updated very often due to the high costs of conducting the studies required. So it is not surprising that few countries can boast current SAMs. Finally, SAMs do not require all markets to clear: that is, to reach an equilibrium where all prices, wages and output produced and sold are consistent. This is a feature of an actual national economy. For this, we need to explore the concept of general equilibrium in a national economy.

VI. Computable General Equilibrium (CGE) Models

In economic theory, general equilibrium analysis addresses how households, firms and markets interact to determine what is produced in a national economy, how it is produced and for whom. This analysis assumes markets are competitive, that prices for inputs and products move freely to equilibrate supply and demand, firms maximize profits, consumers (i.e., households) consume their preferred collection of products, each product is produced under constant or decreasing returns to scale and government does not interfere to restrict these conditions.

In such a competitive general equilibrium world, the economy is at or always moving toward the following states of equilibrium:

- Ratios of marginal utilities of products for all consumers equal to the relative prices of these products;

- Ratios of marginal costs of firms to produce goods and services equal to the relative prices of these products;

- The revenues produced by one additional unit of input for all inputs equal for all firms and all products and equal to those inputs' relative prices.

9

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The Computable General Equilibrium (CGE) models (sometimes called "Applied General Equilibrium Models") extends the SAM structure to address how a national economy adjusts to a shock, such as increased Tourism Expenditure or higher tax rates, and reaches a new general equilibrium with the above features. A CGE is "an economy-wide model that includes the feedback between demand, income and production structures and where all prices adjust until decisions made in production are consistent with decisions made in demand." (Rossouw and Saayman 2011, p. 757) It expands a SAM through linking industries as producers, other institutions, purchasers and markets together by the concept of general equilibrium. For example, a CGE model might specify the following equilibrium conditions (Kehoe 1996):

- Households as consumers maximize the utility of the range of products purchased
- Producers minimize costs subject to feasibility constraints and zero after-tax profits
- Supply equals demand in the market for each product
- Supply equals demand in the labor and capital factor markets
- Government tax receipts equal taxes paid by all producers and consumers
- Government expenditures are fixed
- Exports are fixed

After the equations and variables are specified, time series of SAMs allow calibration of the parameters of the model so that its equilibrium states reproduce the values observed in the most recent SAM. Once the model is calibrated, we can simulate the effects of shocks such as increased visitor spending, higher petroleum prices, higher wage rates in the tourism sector, an increase in tax rates and the like.

Figure 3 presents an example of the flows in a CGE model and the equilibrium conditions. It can be directly compared to Figure 2 to see how the SAM is the basis for CGE modeling.

Figure 3: Example of Flows in a Computable General Equilibrium Model
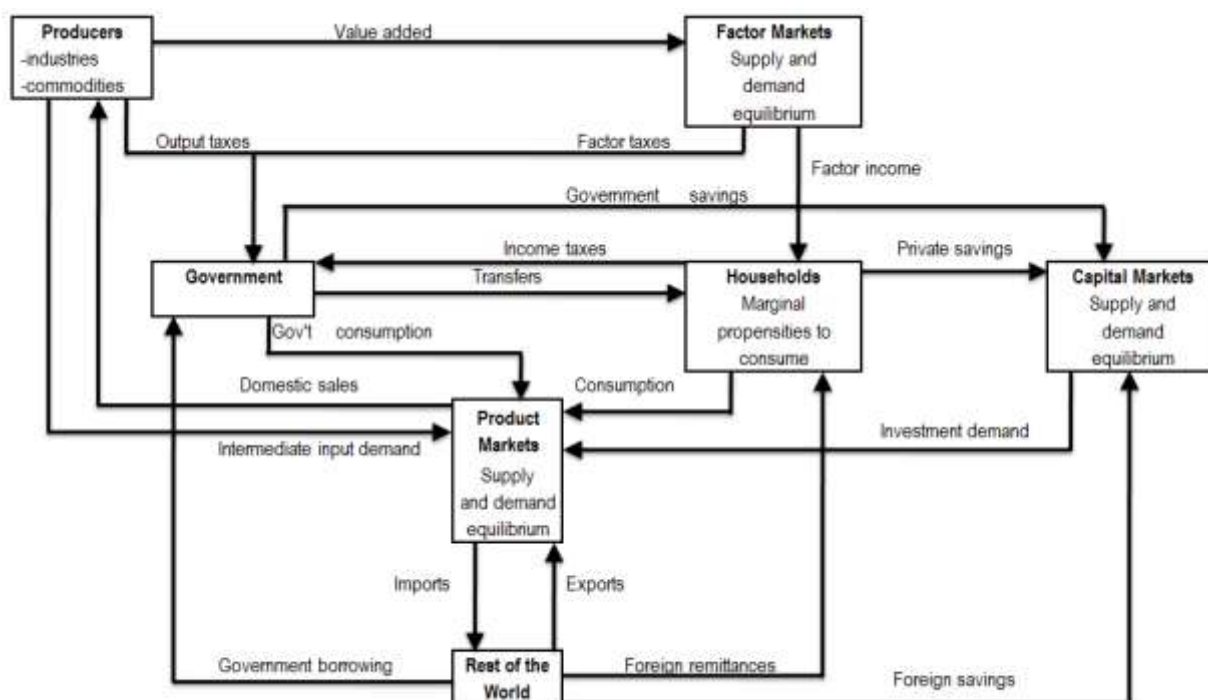
Source: after Inter-American Development Bank (2011)

A.   Comparison of CGE and I-O Models

CGE models reflect the fact that events in one sector of the economy, say the Tourism Sector, will affect other sectors, which, in turn, will feedback effects to the Tourism Sector. They produce estimates of the secondary effects of visitor spending we have addressed with I-O models (transactions, income, employment) and add prices, wages and foreign exchange rates.

CGE models are designed to specifically deal with relationships considered fixed in the I-O model. Table 1 contrasts certain assumptions of the I-O model with what a CGE can be designed to do.

Table 1: Comparison of Assumptions Embodied an Input-Output Model and Assumptions that Can Be Programmed into a Computable General Equilibrium Model

Assumptions of an I-O model	Assumptions of a CGE model
1. All components of Final Demand (consumption, private investment, government purchases, exports) are determined outside the model	All "main" Final Demand components are determined within the model
2. There are no price-induced substitution effects; real wages and real foreign exchange rates are fixed	Price-induced substitution effects may occur; real wages and exchange rates are allowed to vary with demand
3. Government expenditure is exogenous	Government budget deficits are exogenous, but expenditures may vary against revenue
4. Employment supply is perfectly elastic; wages do not rise as employment demand rises	Employment supply is somewhat elastic but may not be high enough to produce all the products; wages rise as employment demand rises
5. Product inputs per unit of product output to final demand are fixed	Product inputs may vary per unit of output to final demand
6. Industry mix of products for final demand is fixed as percent distributions	Industry product mixes may vary in response to changing demand and prices

After Dwyer, Forsyth and Spurr (2006, p. 324)

In brief, a carefully constructed CGE model can represent more of the relationships among sectors in a national economy than an I-O Model or SAM can and explicitly incorporates feedback effects that these two models do not. For example, an increase in international visitor spending in a small island nation can increase the Tourism Sector's demand for employees, raise wage rates, and draw workers away from the agricultural sector. This will raise wage rates in the agricultural sector, causing food prices to rise, which, in turn will increase restaurant prices. Higher restaurant prices may reduce the real (i.e., with price inflation removed) value of visitor spending. And if the domestic agricultural sector is constrained in hiring employees by a lack of unemployed labor, some of the demand for agricultural products for the country must be satisfied by imports, which will depress the country's foreign exchange rates. Usually, the multiplier values found in a country's CGE model from a given change in Tourism Expenditure is far less than that produced in an I-O Model or a SAM for the same change.

B.   Boundaries of CGE Models

CGE models require massive amounts of input data to satisfy the presentation of all of the sectors and their relationships for a year. These data should be continually renewed to reflect year-to-year changes, but this is a very expensive undertaking and may not occur. Indeed, it appears common for a CGE model to depend upon data more than five years old. Developing a CGE model for a single year and then assuming its equations apply over a number of subsequent years seems to be the norm. But the relationships outlined above may well change so that the results do not represent the current world but one that has passed.

Moreover, the quality of the data needed to build a CGE from a SAM is an issue affecting the precision and accuracy of CGE results. Isard, et al., (1998) state:

> *Generally speaking, the magnitudes to be yielded by the [CGE] models envisaged are not to be viewed as precise values. Rather these magnitudes have basic use only in indicating direction of change as change in exogenous inputs, such as policies, tastes, and technology, are introduced. This is the result of the fact that the inputs of data that are currently employed to approximate parameters of a number nonlinear functions are of lesser quality than the data in the [I-O, SAM] models presented. (p. 334)*

CGE models suffer from the lack of validation by comparing a model's results with what actually happens in the world. It is common to develop a CGE model for a base year, input the exogenous variables (such as visitor spending) and then adjust the equations so that the income and output results for each sector match the country totals for that year. But then these equations are assumed to hold unchanged into some years in the future. Yet, comparisons of actual changes in macroeconomic variables such as GDP and employment as a result of a given policy implementation to those predicted by a CGE model are not presented. So these models are seldom validated against the real world.

As opposed to the TSA, CGE models are models. They are simplified representations of reality based on assumptions of the model's builders. And unlike the TSA, these assumptions are quite complex and are never fully explicated for the public in tourism studies. Moreover, in contrast to the I-O models, there is no standard CGE structure that is widely known and accepted. So it is impossible to tell what parts of the CGE output reflect realistic assumptions and which ones are simply products of the builders' assumptions.

Some of the assumptions incorporated in a CGE model may be controversial. For example, users of a CGE need to know whether it embodies the neoclassical economic assumption that investment adjusts to savings in an economy, or the Keynesian assumption that savings adjust to investment. There are arguments for both, but we can agree that the assumptions made should be specified in detail so the user can determine whether to believe the results of a policy simulation or not. Unfortunately, the structural details (parameter values, equation forms, input data vintage) are seldom published, denying users the ability to understand the actual assumptions of the model. This gives rise to objections that, as The Economist magazine has noted, such "opacity risks bringing a useful analytical tool into disrepute" (2006, p. 68).

VII. Expanding the Use of the TSA

The Tourism Satellite Account admirably documents the size of the Tourism Sector and its individual tourism industries, the distribution of tourism consumption among products, and tourism's direct economic contribution to a nation's GDP and employment volume for a given year. This is valuable information for policymakers that has never been available in such an authoritative form before.

However, if policymakers wish to expand their abilities to simulate the results of new policies that affect tourism demand or benefit certain types of households or businesses or push the national economy to a new equilibrium, they need to extend their use of analytical tools to the models discussed in this paper: Input-Output, SAM or CGE.

The TSA displays the product and industry characteristics of Tourism Demand for a country as it contributes to GDP and employment. These measurements are the best drivers of I-O models, SAMs and CGE models focused on the tourism sector. The basic tasks of measuring tourism demand and industry response to it is accomplished by the TSA and can be then spliced into an I-O model, a SAM or a CGE model to extend macroeconomic analysis for policymaking.

Table 2 summarizes characteristics of the four macroeconomic policy analysis tools discussed in this paper.

Table 2. Comparison of Characteristics of the Tourism Satellite Account, the Input-Output Model, the Social Accounting Matrix, and the Computable General Equilibrium Model

Macroeconomic policy analysis tool	Level of effects on a macroeconomy	Shocks that can be analyzed	Results	Strengths	Boundaries
TSA	Direct	Changes in visitor consumption by product	Tourism's contribution to GDP and employment by industry for a given year	Explicitly incorporates visitor demand by product and industry TSA is an account that is often updated annually and benchmarked every 5 years	Certain elements of direct impact only; cannot present details for different types of firms, households or other institutions
Input-Output	Direct, indirect and induced effects on output, income and employment	Changes in consumption by product or industry	National output, income, employment, value added	Well-understood, standard methodology; standardized construction and presentation	Assumes no constraints on availability of factors of production; that prices and wages do not vary; that distribution of factor inputs required by outputs does not vary
Social Accounting Matrix	Indirect and induced effects on output, income and employment; by disaggregated households, firms and other institutions, products, types of demand and other elements of the macroeconomy	Changes in consumption by product or industry; changes in policy: tax rates, government spending, price inflation,	National output, income, employment, value added; product prices, wage rates; broken down by type of household, labor and capital source	Disaggregates households, firms and other institutions, products, types of demand and other elements of the macroeconomy according to analytical needs and data resources	No standard methodology or presentation; same Boundaries as I-O model
Computable General Equilibrium models	Indirect and induced effects on output, income and employment; prices and wage rates by industry	Changes in consumption by product or industry; changes in policy: tax rates, government spending, price inflation,	National output, income, employment, value added; product prices, wage rates; broken down by type of household, labor and capital source	Allows factor of production prices to vary; effects of resource constraints covered; all markets clear	No standard methodology or presentation; posited relationship equations, parameters, elasticities seldom made public; heavily dependent on assumptions requires massive input data that is seldom current; require validation against the actual economic

Moreover, the TSA can initiate estimation of the additional elements of Tourism Economic Impact in a CGE. Intermediate and final outputs of the TSA can be incorporated as driving forces in a properly developed and documented CGE model to indicate the quantitative effects of public policy changes. So, the power of the TSA to explain economic impacts of tourism in a country can be extended by integrating it into a valid CGE model.

A valid CGE model can be described as one where its internal relationships, assumptions, parameters and data sources are documented and its results confirmed by measurable changes in the nation's economy. When the TSA is integrated into the CGE model, it is connected to the rest of the economy, and the macroeconomic effects of alternative policies can be traced and quantified. In short, the TSA provides the valid detail on output generated by Tourism Expenditure and the CGE extends this to detailed impact measures based upon its assumptions.

Rossouw and Saayman (2011) provide a seminal example of extension of the TSA through integration with a CGE model in South Africa. It has been used to simulate the economy-wide effects of a decline in tourism demand in terms of which industries would suffer the most and which would be unaffected. Another scenario prepared for investigation through the integrated model encompasses the effects of hosting a world-class sports event on reducing unemployment and poverty in the country.

VIII. Future Research

The following are suggested projects that can expand world understanding of Tourism Economic Consequences and aid national policymakers in their quests to ensure tourism plays a positive role in their economies.

UNWTO might coordinate specification of the Social Accounting Matrix that best helps policymakers to simulate the effects of shocks and other potential policies on country's tourism economies and national economies.

Gathering case studies on Computable General Equilibrium models and SAMs used to assist tourism-related policymaking can help develop appreciation for the results of such models, suggest best practices in model building and inform policymaking for the tourism sector.

The TSA can be extended to sub-national regions through agreement on a framework, relationship to national TSA and input data. However, until one of the alternatives outlined in Annex 7 of Tourism Satellite Account: Recommended Methodological Framework 2008 is selected for elaboration, we cannot speculate on how this should be done.

In addition, the characteristics of employment in the tourism sector presented in a TSA can be expanded to include occupations, skill levels, wage levels, full-time versus part-time and seasonal jobs.

UNWTO should coordinate the elaboration of data required and recommended methodological framework for the missing components of Total Tourism Internal Demand: Tourism Gross Fixed Capital Formation and Tourism Collective Consumption.

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Appendix. Understanding Tourism: Basic Glossary[1]

The glossary has been made possible thanks to the international community's work on defining a new conceptual framework for measuring and analysing tourism economics; an effort that lasted almost three years (2005/2007). The international consensus that followed, in the form of United Nations approved *International Recommendations for Tourism Statistics 2008* (IRTS 2008), establishes the concepts, definitions, classifications and the basic set of data and indicators that should be part of any national System of Tourism Statistics.

Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called *visitors* (which may be either *tourists* or *excursionists*; residents or non-residents) and tourism has to do with their activities, some of which imply *tourism expenditure*.

As such, tourism has implications on the economy, on the natural and built environment, on the local population at the destination and on the tourists themselves. Due to these multiple impacts, the wide range and variety of production factors required to produce those goods and services acquired by visitors, and the wide spectrum of stakeholders involved or affected by tourism, there is a need for a holistic approach to tourism development, management and monitoring. This approach is strongly recommended in order to formulate and implement national and local tourism policies as well as the necessary international agreements or other processes in respect of tourism.

Business visitor	A *business visitor* is a *visitor* whose main purpose for a tourism trip corresponds to the *business and professional* category.
Country of reference	The *country of reference* refers to the country for which the measurement is done. As a general observation, it should be noted that in the *International Recommendations 2008*: (a)　The term "country" can be transposed to a different geographical level using the term "place" instead (either a region, municipality or other subnational geographic location); (b)　The term "long-term" is used as the equivalent of a year or more and "short-term" as less than a year.
Country of residence	The *country of residence* of a household is determined according to the *centre of predominant economic interest* of its members. If a person resides (or intends to reside) for more than one year in a given country and has there his/her *centre of economic interest* (for example, where the predominant amount of time is spent), he/she is considered as a *resident* of this country.
Destination (main destination) of a trip	The *main destination of a tourism trip* is defined as the place visited that is central to the decision to take the trip. See also *purpose of a tourism trip*.
Domestic tourism	Comprises the activities of a resident *visitor* within the country of reference, either as part of a *domestic tourism trip* or part of an *outbound tourism trip*.
Economic analysis	Tourism generates directly and indirectly an increase in economic activity in the places visited (and beyond), mainly due to demand for goods and services that need

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[1] This Annex includes some key concepts and the corresponding definitions as conveyed in the *International Recommendations for Tourism Statistics 2008* (*IRTS 2008*), http://statistics.unwto.org/en/content/tourism-statistics-irts-2008-0. While some of them focus exclusively on the economic measurement of tourism, others (like the key concepts of visitors (including tourists and excursionists), trip, usual environment, forms of tourism, etc.) are also applicable to other areas of analysis and research.

16

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to be produced and provided.

In the *economic analysis* of tourism, one may distinguish between tourism's 'economic contribution' which refers to the direct effect of tourism and is measurable by means of the TSA, and tourism's 'economic impact' which is a much broader concept encapsulating the direct, indirect and induced effects of tourism and which must be estimated by applying models.

Economic impact studies aim to quantify economic benefits, that is, the net increase in the wealth of residents resulting from tourism, measured in monetary terms, over and above the levels that would prevail in its absence.

Employment in tourism industries

Employment in tourism industries may be measured as a count of the persons employed in *tourism industries* in any of their jobs, as a count of the persons employed in *tourism industries* in their main job, as a count of the jobs in *tourism industries*, or as full-time equivalent figures.

Excursionist (or same-day visitor)

A *visitor* (*domestic*, *inbound* or *outbound*) is classified as a *same-day visitor* (or *excursionist*) if his/her *trip* does not include an overnight stay.

Forms of tourism

There are three basic forms of tourism: *domestic tourism*, *inbound tourism*, and *outbound tourism*. These can be combined in various ways to derive the following additional forms of tourism: *internal tourism*, *national tourism* and *international tourism*.

Inbound tourism

Comprises the *activities* of a non-resident *visitor* within the country of reference on an *inbound tourism trip*.

Internal tourism

Internal tourism comprises *domestic tourism* plus *inbound tourism*, that is to say, the *activities* of *resident* and *non-resident visitors* within the *country of reference* as part of *domestic* or *international tourism trips*.

International tourism

International tourism comprises *inbound tourism* plus *outbound tourism*, that is to say, the *activities* of *resident visitors* outside the *country of reference,* either as part of *domestic* or *outbound tourism trips* and the *activities* of *non-resident visitors* within the *country of reference* on *inbound tourism trips*.

Meetings industry

To highlight purposes relevant to the *meetings industry*, if a trip's main purpose is business/professional, it can be further subdivided into "attending meetings, conferences or congresses, trade fairs and exhibitions" and "other business and professional purposes".

The term *meetings industry* is preferred by the International Congress and Convention Association (ICCA), Meeting Professionals International (MPI) and Reed Travel over the acronym *MICE* (Meetings, Incentives, Conferences and Exhibitions) which does not recognize the industrial nature of such activities.

MICE

See *meetings industry*.

National tourism

National tourism comprises *domestic tourism* plus *outbound tourism*, that is to say, the *activities* of *resident visitors* within and outside the *country of reference,* either as part of *domestic* or *outbound tourism trips*.

Outbound tourism

Comprises the *activities* of a resident *visitor* outside the country of reference, either as part of an *outbound tourism trip* or as part of a *domestic tourism trip*.

Place of usual residence

The *place of usual residence* is the geographical place where the enumerated person usually resides, and is defined by the location of his/her principal dwelling (*Principles and Recommendations for Population and Housing Censuses* of the United Nations,

para. 2.20 to 2.24).

Purpose of a tourism trip (main)

The *main purpose* of a *tourism trip* is defined as the purpose in the absence of which the *trip* would not have taken place. Classification of *tourism trips* according to the *main purpose* refers to nine categories: this typology allows the identification of different subsets of *visitors* (business visitors, transit visitors, etc). See also *destination of a tourism trip*

Tourism expenditure

Tourism expenditure refers to 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.

Tourism industries

Tourism industries (also referred to as *tourism activities*) are the activities that typically produce *tourism characteristic products*.
Tourism characteristic products are those that satisfy one or both of the following criteria:

(a)   *Tourism expenditure* on the product (either good or service) should represent a significant share of total *tourism expenditure* (share-of-expenditure/demand condition);

(b)   *Tourism expenditure* on the product should represent a significant share of the supply of the product in the economy (share-of-supply condition). This criterion implies that the supply of a *tourism characteristic product* would cease to exist in meaningful quantity in the absence of visitors.

List of categories of tourism characteristic products and tourism industries

Products	Industries
1. Accommodation services for visitors	1. Accommodation for visitors
2. Food and beverage serving services	2. Food and beverage serving activities
3. Railway passenger transport services	3. Railway passenger transport
4. Road passenger transport services	4. Road passenger transport
5. Water passenger transport services	5. Water passenger transport
6. Air passenger transport services	6. Air passenger transport
7. Transport equipment rental services	7. Transport equipment rental
8. Travel agencies and other reservation services	8. Travel agencies and other reservation services activities
9. Cultural services	9. Cultural activities
10. Sports and recreational services	10. Sports and recreational activities
11. Country-specific tourism characteristic goods	11. Retail trade of country-specific tourism characteristic goods
12. Country-specific tourism characteristic services	12. Other country-specific tourism characteristic activities

Tourism Satellite Account (TSA)

The *Tourism Satellite Account* (described in the *Tourism Satellite Account: Recommended Methodological Framework 2008*) is, besides the *International Recommendations for Tourism Statistics 2008*, the second international recommendation on tourism statistics that has been developed in a framework of consistency with the System of National Accounts. Both recommendations are mutually consistent and provide the conceptual framework for measuring and analyzing tourism as an economic activity.

As a statistical tool for the economic accounting of tourism, the TSA can be seen as a set of 10 summary tables, each with their underlying data and representing a different aspect of the economic data relative to tourism: inbound, domestic tourism and outbound tourism expenditure, internal tourism expenditure, production accounts of tourism industries, the Gross Value Added (GVA) and Gross Domestic Product (GDP) attributable to tourism demand, employment,

investment, government consumption, and non-monetary indicators.

Tourism sector	The tourism sector, as contemplated in the TSA, is the cluster of production units in different industries that provide consumption goods and services demanded by visitors. Such industries are called *tourism industries* because visitor acquisition represents such a significant share of their supply that, in the absence of visitors, their production of these would cease to exist in meaningful quantity.
Tourist (or overnight visitor)	A *visitor* (*domestic, inbound* or *outbound*) is classified as a *tourist* (*or overnight visitor*), if his/her *trip* includes an overnight stay.
Travel / tourism	*Travel* refers to the activity of travellers. A traveller is someone who moves between different geographic locations, for any purpose and any duration. The visitor is a particular type of traveller and consequently tourism is a subset of travel.
Travel party	A *travel party* is defined as *visitors* travelling together on a *trip* and whose expenditures are pooled.
Trip	A *trip* refers to the travel by a person from the time of departure from his/her usual residence until he/she returns: it thus refers to a round trip. Trips taken by visitors are tourism trips.
Usual environment	The *usual environment* of an individual, a key concept in *tourism*, is defined as the geographical area (though not necessarily a contiguous one) within which an individual conducts his/her regular life routines.
Vacation home	A *vacation home* (sometimes also designated as a holiday home) is a secondary dwelling that is visited by the members of the household mostly for purposes of recreation, vacation or any other form of leisure.
Visit	A *trip* is made up of visits to different places. The term *tourism visit* refers to a stay in a place visited during a *tourism trip*.
Visitor	A *visitor* is a traveller taking a *trip* to a main destination outside his/her *usual environment*, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited. A *visitor* (*domestic, inbound* or *outbound*) is classified as a *tourist* (or overnight *visitor*), if his/her *trip* includes an overnight stay, or as a same-day *visitor* (or excursionist) otherwise.